

The Learning Marketplace

Meaning, Metadata and Content Syndication in the
Learning Object Economy



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Moncton, New Brunswick

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Introduction

This is not a real book. If this were a real book, I would have to eliminate the redundancies, correct awkward expressions, employ a consistent chapter scheme (including the provision of names for all the chapters), and locate (or at least explain the disappearance of) a certain section B in one of the papers.

If this were a real book, I would have to make it interesting. And rest assured, unless you are deeply interested in such topics as learning objects, metadata and content syndication, this will be to you one of the least interesting books of the year. For myself, I find these issues fascinating, and the issues surrounding them pressing. But I do not expect my enthusiasm to carry.

So why does this book exist at all? This is actually two questions: why does the book exist *now*, as a book, when it did not exist yesterday? And why did I engage in what amounts to a discourse on these topics in the first place?

The second question is easy. This afternoon I received an email from someone announcing a number of ‘discoveries’ consisting of some of the works contained below. And while on the one hand I was pleased that he had found the (to me) important works, on the other hand I was disappointed that he had missed them for so long, and still missed some crucial papers. But in the end, this is my fault, as my work is scattered across the four corners of the web. This book is something like an attempt to create an authoritative account of the last three years.

Which brings me to the second question: why bury one’s mind in such arcane matters at all?

In the first months of 2001 I accepted a research fellowship at the University of Melbourne where philosophy professor Tim van Gelder was attempting, like many professors, to put his course online. During the course of this work I explored the idea of making his courses available through learning management systems. On finding one roadblock after another, I concluded that the vision outlined in some of my earlier work was being hampered by a lack of vision of what *could* be realized by online learning.

In Australia, I wrote a paper that may be found below, *The Learning Marketplace*, in which I outlined the mechanics of a content syndication system. It drew on some of the concepts outlined in *Learning Objects* and *Content Syndication and Online Learning*. In bits and pieces over the next three years, I continued to fill in the details of the model. This book does not contain *everything* I wrote during that time – it is devoted solely to the topics of (as the title suggests) meaning, metadata and content syndication in online learning.

That’s the beginning, then. Most of these papers are part of that work in progress, in a sense, drafts that build on each other (which is why you will find repetition (which in a *real* book I would have to excise, thus removing the essence of discovery). In addition to the straightforward mechanics of content distribution (which you would *think* is straightforward) I encounter issues as varied as ontology, legal policy, the open source credo, morality, semantics, and technical design.

So in a sense, I think that this book is much more than merely a technical text on how to create a content syndication network. It is at the same time an extended discourse on how we, as a society, ought to create and acquire knowledge, which in turn becomes a discourse on what constitutes

knowledge, how we related to it, and how we talk about it. An essay like *The New Literacy* may seem as far removed from a technical treatise as you may get, but unless you create the analogy of multimedia objects as *words* in a new language, many of the concepts seem muddled and disjointed. Allow us to *communicate* with learning objects, however, and the flow from *Education and Embodiment* to *The Aeffability of Knowledge Management* to *The Lattecentric Ecosystem* to *Design and Reusability of Learning Objects* becomes clear.

Well, mostly clear.

Anyhow, to preserve the sense of discovery and of wrestling with the issues, the papers are presented in mostly chronological order. I say ‘mostly’ because I have made some allowances for clarity of exposition and elucidation of concepts before their use. But not much. It is important to me that readers be able to follow the logic of discovery as well as that of the linear syllogism and the intermingling of threads.

But all of that said, I want to stree that there *is* a single, unified theory underlying all of my work, a theory that, because it can’t be summarized in nine steps or a neat taxonomy, is perhaps a but hard to grasp, but is nonetheless as powerful, as expressive, and in my view, as correct as any other approach to the discipline. If I had to give it a name, I would call it ‘network learning’ (though that name has already been taken). In any case, it is very difficult to see the strands of the theory, much less the structural and methodological consistency between strands, without being able to view my work here as a single entity.

What I present here is as much an epistemological, moral and political theory as it is a theory of learning. It is based in philosophy of mind, the logic of connectionism, post-foundational epistemology, and empirical underdeterminism. It is as much a story about how we, in fact, construct our reality as it is a story about the nature of that reality (but though it shares affinities, it is not construtivism and should not be represented as such).

Think of this theory as the rejection of the unified field or the idea that there is one, knowable, fundamental law of everything. Think of it as the recognition that perception, reality, knowledge, learning, software and society come in discrete chunks – epistemological quanta, if you will – and that what we do when we create schools or civilizations is a function of how these chunks are organized. Think of there being *layers* of these chunks, such that each subsequent layer is composed out of entities that are *emergent properties* of the preceeding layer, and that the nature of these emergent properties depends in part on how the chunks are organized (like the pixels on a television screen) and in part on their perception at the higher layer (I say ‘layers’ but it would be more accurate to think of it as an n-dimensional ordering of reality, not a neat linear progression of layers).

On such a model, the idea of universal theory – in anything – is not only misguided, it is *wrong*, wrong empirically, since it results in false theories, and wrong ethically, since it seeks to impose order from one layer, where an ethical theory may apply, to another, where it makes no sense. One might say, for example, that the figure depicted in the television image is evil, but it would make no sense to say, therefore, that the pixels that comprise that picture are themselves evil. The goodness of a pixel has nothing to do with the goodness of an image, which in turn, has nothing to do with the goodness of a society.

If we cannot, then, employ the tradition of observation and generalization, definition and prescription, causal reasoning and effect analysis, then how should we approach these disparate

phenomenal? That's what this book is about. Yes, true, it is about the *design* of a knowledge and information network, but it is inherent in the design that the rules (so to speak) for such discourse emerge. The best I can do here is to point to instances and hope that you, the perceiver, 'see' the 'picture' in your head that corresponds with the system I am describing – understanding, always, that your picture will be different from mine.

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This article began as a in DEOS as a response to some of the complaints about educational technology being posted. It captures some of my intuitions about technology and development and tries to express the idea that people need to choose their technology. Jim Morrison asked me to write the first paragraphs to adapt it for publication in Technology Source.

Nine Rules for Good Technology

*Written March 7, 2000. Published in [The Technology Source](#), July/August, 2000. Reprinted as "Mmm, God Technology", *University Business*, September, 2000. *The CyberUnion Handbook: Transforming Labor through Computer Technology*, by Arthur B. Shostak, et al., M.E. Sharpe, 2001.*

Introduction

Today's educational technology is like a Rube Goldberg contraption. Enter any technology-enabled classroom or other facility, and you will see a mish-mash of computers with associated wires, video displays, modems, ITV, CD-ROM libraries, tapes, and more. To use this technology effectively and avoid being distracted by the usual malfunctions and dense manuals, teachers must spend a lot of time in the classroom themselves.

It doesn't have to be this way, however. As technologies mature, they tend to become easier to use. Consider the elevator and radio, for example. Once so finicky it needed operators to take riders from floor to floor, today's elevator functions flawlessly with little intervention on the part of users. Likewise, when the radio was first developed, it was the domain of specialists. Today's radio is a model of usability, requiring no special training for the listener who wants to find the nation's top ten hits.

It is true that not all technologies are so uncomplicated. For example, the person who operates a nuclear reactor must have some expertise and special training. But such systems are rare, overwhelmed by an array of far simpler innovations. If a technology is to become widespread, it is crucial that it be easy to use—so easy that it need not be packaged with an operating manual. Technology that teachers employ in the classroom must be of exactly that variety: widespread and easy-to-operate. A learning simulation, a conferencing tool, and a student record keeper should be as untroublesome to use as a television, a telephone, and a notebook.

I believe that we currently are in a transition phase; we are moving away from complicated technologies toward simpler innovations. For the most part, however, today's technology remains clumsy. We must question whether the time and money we are investing in that technology—in teaching teachers to use it—is well spent. Certainly training is necessary to get us to a higher level of technological advancement, but we must not take our eyes off the long term goal: good technology.

What distinguishes a good technology from a bad technology? The following nine characteristics define the former. Think of them as a checklist; a technology that has more of these features is, in general, better than a technology which has fewer of them.

Good Technology: The List

Good technology is always available. This distinction is what makes buses, in spite of all of their advantages, bad technology. People cannot count on catching the bus at absolutely any time of day; thus most people prefer cars. In the educational field, the technological equivalent of the bus is the equipment trolley. It is necessary because only one projector (or workstation or overhead projector) is available to serve five classrooms. Imagine what life would be like if we had to schedule our use of the elevator. Or to make reservations to use the telephone. Good technology does not require scheduling, relocation, or set-up.

The availability requirement raises cost considerations. Equipment that costs less is more likely to be available. But cost is not the sole or even primary determinant. If a technology meets the other criteria described below, it will be made widely available despite the cost. Think of ATMs, electrical lights, and highways.

Good technology is always on (or can be turned on with a one-stroke command or, better yet, starts automatically when the need for it arises). One thing that makes the telephone useful is that we do not need to boot up the operating system before we make a call. Likewise, electrical lights are a significant improvement over systems that required individual ignition with a match or candle, and streetlights are practical because they come on when it gets dark outside. A weakness of motor vehicles is that they are not always on, a fact that causes endless frustration for users needing transportation on cold winter days.

Much of today's educational technology requires long and sometimes cumbersome initialization procedures. After wheeling in a projector from another room, for example, three teachers and a technician may spend time plugging it in, turning it on, spooling the film, and positioning the screen.

Admittedly, the "always on" requirement raises significant energy consumption considerations. A portable device that consumes a lot of energy, for example, cannot always be on because it must carry its own power supply. Energy itself—in inefficient forms like gas and oil—is too expensive to be consumed merely for convenience. Devices with low energy consumption, however, can always be on. Think of watches, telephones, and elevators.

Good technology is always connected. Good technology can send information when and where it is needed without human intervention. Fire alarms, especially institutional ones, are useful in this way. Indeed, if the detectors were not connected to warning systems, the alarms would be useless. Again, telephones are useful because no procedure is required to connect to the telephone system.

As recently as last month, I spent fifteen minutes in a room with a dozen or so highly paid professionals waiting for an ITV system to be connected to a remote location. I have spent much time listening to my modem dial up a local provider (and luxuriate today in the convenience of an always-on Digital Subscriber Line connection).

Good technology is standardized. One television functions much like another television (televisions became less useful with the introduction of brand-specific remotes). One telephone connects to any other telephone in the world. One brand of gasoline powers your car as well as any other—but cars that require different grades of fuel, such as diesel, are bad technology because of their reliance on non-standard fuel.

Standardization promotes interoperability. Interoperability means that you have choices, that you are not locked into one supplier or vendor. It means that you can adapt easily to improved

versions of the same technology: you can upgrade to a bigger television or engine-cleaning gasoline without replacing your electrical wiring or car engine. A video that is designed to be played only on a specific computer platform and email that may be read only via a specific Internet Service Provider are examples of bad technology. Video should be viewable on all platforms and email should be accessible through any Internet service provider.

Good technology is simple. Simplicity is a slippery concept, but the best technologies can be learned by looking at the input device, not by studying a manual.

Here's how I distinguish between good computer programs and bad computer programs: I try to install and run the program without the use of any manual. Installation is much easier today, thanks to a good computer program called "Setup." Running the program is a different matter. When I have to stop and think (and read very small print) about how to get rid of a paperclip icon so that I can type a letter, I know I am dealing with bad technology. Good technology, by contrast, is intuitive. To use an elevator, I press the floor number. Simple. To make a phone call, I dial the number. Easy.

Simplicity goes hand-in-hand with range of function. Features that you never use get in the way, and they make the product complicated and cumbersome. Look for technology that does exactly what you want: no more, no less.

Good technology does not require parts. Cars are bad technology: they require a never-ending array of parts, from gasoline to oil to air filters. It is easy to overlook parts because they seem integrated into the whole; consumables, like oil or ink cartridges, don't satisfy our intuitive definition of parts. But insofar as they must be replaced and are essential to the operation of technology, they count as parts, at least for the purposes of this article.

The bottom line is this: Do you have to purchase something on a regular basis in order to use your technology? Do you have to replace something that becomes worn out or depleted or that can be lost or stolen? The fewer times you have to purchase or replace, the better your technology; the best technology requires no ongoing purchases or replacements at all.

Sometimes it is not possible to do without parts, but this is a sign of a transitional technology. Perhaps even good technologies, such as portable stereos that require CD-ROMs, need parts. But a portable stereo that does not need CD-ROMs because it can download MP-3s from the Internet instead would be better. If parts are absolutely necessary, they should be widely available, standardized, and simple to install. DVD players, for example, will not qualify as good technologies until DVDs become as widely available as videotapes.

Good technology is personalized. Some of the simplest technologies succeed because they are personalized. One of the things that makes a telephone useful is that you have your own telephone number. In a similar manner, e-mail is useful because you have your own e-mail address. ATM cards would not be at all useful unless they opened your bank account and only your bank account. Credit cards, smart cards, pagers, cell phones, and eyeglasses are more examples of personalized technologies.

Bad technology forces you to fit its requirements. I purchased my copy of Microsoft Word in Canada, but the default dictionary was for American English. I could install a British dictionary, but Canadian English is distinct from both British and American English. Like many users, I am forced to add each distinctly Canadian word to a custom dictionary. This is bad technology. Why

can't I simply tell Word that I am Canadian (or an architect, or a member of some other specialized group) and have it retrieve the appropriate spellings for me?

Good technology is modular. By "modular" I mean composed of distinct entities, each of which works independently of the others and may be arranged or rearranged into a desired configuration with a minimum of fuss and effort. To a degree, this requirement is a combination of the requirements that good technology be standardized and personalized, but modularity takes technology a step beyond either of those features.

Bricks and wood are good technology because they interconnect neatly and can be assembled into custom configurations. Legos are even better because they do not require parts like nails or cement (which is why Lego, and not Mecanno, is the construction toy of choice).

The stereo systems we purchased in the 1970s are good examples of modular technology. Using the standardized RCA jack, we could assemble systems with or without pre-amps, tuners, equalizers, or even turntables. Today's Universal Serial Bus (USB) represents good technology because it allows computer systems to be assembled like the stereos of old. Books—and paper in general—are good because they are modular; a person may assemble a book, such as a binder, out of individual sheets of paper and a library out of a collection of books.

Good technology does what you want it to do. And it doesn't do something else. "Doing what you want it to do" means the same thing as "idiot proof." Good technology minimizes the potential for operator error and thus the possibility of unexpected consequences. Good technology is also robust—less prone to breakdowns and malfunctions—and reliable. Software that crashes instead of running is obviously bad technology. Telephone systems that connect you to India instead of Indiana are not useful.

"Doing what you want it to do" is a highly personal thing. If you want your daughter's clothes to protect her from the cold, then her selection of a light chiffon top and an ultra-mini skirt represents bad technology. But if she wants clothes to accentuate her physical features, then the same clothes represent good technology.

Conclusion

It is important to remember that no technology is perfect. No technology will satisfy all nine rules. However, some technologies will satisfy more rules than others, and some technologies will even break a rule or two and still be very good technologies (if only because no better alternative is available). That said, purchasers should insist on—and vendors should be pressed for—good technology as defined above. We spend too much time and money on new technology to be satisfied with anything less.

This article, like the last, was written before my trip to Australia and is included here in order to set the theoretical stage. While Nine Rules looks at technological design, this article looks at market design. These two concepts weave through this book, the one being of course dependent on the other. While on the one hand I am trying to suggest that portals will not become the destination of choice for internet users (a prediction that has now come to pass), I am also trying to suggest that branded institution-specific marketing of learning materials will likewise fail. People – especially those trying to promote a specific institution – still have a hard time wrapping their head around this idea. They want to create an environment where choices are limited to the offerings of single (or select sets of) providers. It won't work, not because it can't be done, but because people don't want it.

Hungry Minds: A Commentary on Educational Portals

Written November 15, 1999. Published in [Online Journal of Distance Learning Administration](#), Volume III, Number I, Spring 2000.

The front end of Hungry Minds (<http://www.hungryminds.com/>) is an education portal modeled along the lines of another portal, About.Com (<http://www.about.com>; originally called The Mining Company). Hungry Minds' experts author a topical home page with commentary and links to resources and especially online courses.

In taking this approach, Hungry Minds is pursuing a path that intuitively seems correct - the idea that people searching for online learning opportunities will follow a topic-based pattern, and not an institutionally based pattern. For example, a person wishing to take a course in Roman History will search for 'Roman History'; they will not instead check out the University of Alberta or the University of California.

This is not entirely the case, of course. All universities have an established client base, represented by existing and former students with a stake in that particular university's credentials. And to some degree, the cachet of some universities, such as Harvard or Princeton, will draw additional students. But this is a client base on the wane; as continuing education especially rises to the fore, students will first search for the topic area, and only then consider the name and reputation of the institution offering the courses.

I belabor this point because it has been the practice of most traditional educational institutions to place most of their efforts into the creation of institutional, and not topic-based, portals. That is to say, most institutions list only their own course offerings, to the exclusion of other institutions. They rely on people using standard search engines to locate the course, though of course the portal is structured as though someone would first look up 'The University of Alberta' and then peruse the course offerings (indeed, the [University of Alberta](#) menu further requires that you proceed to individual faculty pages before you see any course listings).

I'll call this the 'restaurant' model of online course offerings. Like restaurants, traditional institutions are appealing to their name and reputation (and the occasional review). The only 'brand' present in a restaurant is the restaurants' own; the only choices offered are from the restaurant's own menu. Production and consumption is localized. Advertising promotes above all else the restaurant's name and distinctive quality.

It is hard to over-emphasize this point. For even where some various institutions have formed coalitions, the tendency has been to favor the individual institution over the breadth of content and expertise. California Virtual University (CVU) is a classic example of this (Downes, 1999). Even though a consortium was formed, each institution clung rigidly to its own identity and methodology, even to the point of individualized course numbering systems.

Now online learning portals have existed for some time - I can off the top of my head list [TeleEducation](#) and the WWWDEV course database at the [University of New Brunswick](#). Even in such portals, courses are listed by topic. The name of the institution appears only as an attachment to individual courses.

What is new about Hungry Minds - and about [UNext](#), a similar service recently featured in [Wired News](#) - is that these agencies are acting as online course brokers. Rather than merely listing online courses, they are acting in some capacity as a representative for both the course vendors and the potential students.

Thus, for example, Hungry Minds offers prospective learners a [guarantee that offers a refund](#) on any online course they take. And UNext, while it offers no financial guarantees, is focusing on the quality of its course offerings (it lists three Nobel laureates at the top of its academic advisory board).

These institutions are taking what I will call the 'grocery store' model of online education. They act as a distributor for brand-name products in such a way that the store - not the producers - manages purchases and refunds, and the store - more so than the producers - stands as the agent that ensures quality and price.

Now the easy approach at this point would be to argue that the grocery store model is on the ascendant, and the restaurant model is on the decline, because people prefer choice and selection, and because they prefer the guarantees and single interface that grocery store providers offer them. And to a significant degree, this will be what happens - while restaurant vendors may not see a decline in customers (they have a locked-in client base, after all), they will not participate in the enrollment boom online learning will engender.

More and more, restaurant vendors will focus on service and quality of offerings (some, such as [ZD University](#) (now renamed SmartPlanet as part of Ziff-Davis's new online learning initiative) will focus on price and availability). This is the main thrust behind, say, Michael Cenker's remarks to ATLNet - "One idea that's been batted about in the Faculty of Extension is to provide a cluster of services for new students, in this case, foreign students (Cenker,1999)."

It has been remarked in the past that educational institutions will have to shift from being repositories of knowledge toward becoming service-oriented agencies (Downes, 2000) and this remains true. Such services, localized within an institution (even a large one, such as the University of Alberta), are costly, however. In order to keep costs down, even restaurant-type vendors will be drawn inevitably toward the grocery store model.

In the grocery store world, an inevitable battle is taking shape as different grocery stores try to establish themselves as the exclusive - or at least, the primary - broker for online courses. Hungry Minds and UNext represent two poles in this battle. Hungry Minds is focusing on expertise and service guarantees. UNext is focusing on expertise and exclusive offerings. Each is trying to segment the market, offering courses nobody else offers. It is as though Safeway - and only

Safeway - sold Heinz products, while Save-On was the exclusive dealer of Kraft products.

But in the end, neither the restaurant nor the grocery store will be the primary agent of online learning.

The machinations emerging in the online learning community mirror the machinations that occurred when previous monopoly services, such as long distance telephony or cable television, were opened to competition. A raft of competing vendors emerged, spending a pile of money on name and brand recognition (the recent press campaigns supporting Hungry Minds and UNext are instances of this). They began by focusing on quality (as in Sprint's 1-800-PIN-DROP campaign) and choice (as in the satellite-TV's 800 channels campaign).

But consumers were unable to find the suggested difference in quality - a long distance call is essentially the same no matter who provides it; FOX is FOX whether delivered by satellite or by cable. They next began to focus on price - but since the price of these services is essentially the same, various Byzantine pricing schemes emerged to obscure the difference. Expect a similar price war in the field of online learning, bolstered by commentaries complaining about the high cost of online learning.

But with quality and price being essentially non-factors, and with brand recognition able to carry only a small percentage of online learning institutions (who will charge a premium for this, thus maintaining their exclusivity), there will be nothing to choose from between Hungry Minds, UNext, and the many similar services which will operate across the world wide web.

So in planning for the future, education providers - both course-delivering institutions and aspiring portals - will have to look hard at what actually motivates the purchase of food, long distance telephony, cable television services, and any other commodity. And that factor (which also motivates love, marriage, crime and corruption) is proximity.

Think about it. Where do you buy your groceries? Do you drive across town in order to get the superior quality offered by the west-end Loblaws? Probably not; you probably buy your groceries within a kilometer of your home. Which restaurants and pubs do you patronize? I am a regular at the Inglewood, which happens to be two blocks from my front door. My long distance is provided by the local phone company, my cable from the local cable company, and if I were to commit a crime, it would probably be in my own neighborhood.

The same is true - has historically been true - of education. It is no coincidence that most students at the University of Alberta are from Alberta. While there is more mobility in education than in - say - restaurant selection, and while some name-brand institutions can attract scholars from around the world, in the main, people eat, sleep, learn and love where they live.

But what constitutes proximity on the world wide web? One truism is that the web breaks down physical distance. Once, people fell in love with and married people they met locally (and this is still how the vast majority of couples do it). But increasingly, couples are meeting and marrying online (<http://www.webring.org/cgi-bin/webring?ring=netmate;list>). In areas where physical proximity was paramount, the internet is breaking down that barrier and uniting people from around the globe.

Yet - even in the area of online romance - proximity is still vital. Browse through the hundreds of personal pages describing online romances and you will find ([Alta Vista Search](#)) in every one of

them a reference to a particular MUD, chat line, IRC channel, discussion board, or other online forum.

Proximity on the internet falls under the loosely defined category of 'online community'. Though only recently discovered by mainstream academics and corporate pundits, the proliferation of online communities is what has *always* defined the internet. In the early days, netizens populated particular MUDs, IRC channels or newsgroups. Today, people congregate around portals, mailing lists, discussion boards and chat rooms.

There is some research that reveals this pattern in web usage. Tauscher and Greenberg (1997) report, for example, that "People tend to revisit pages just visited, access only a few pages frequently, browse in very small clusters of related pages, and generate only short sequences of repeated URL paths." In other words, people find the sites they like and tend to stay with them.

While a variety of factors influence a person's choice of websites (for example, people will leave sites which are too slow), the primary determinant is interest. The site discusses some topic that is important to that particular person. Indeed, a person's interests may be deduced from the sites they frequent - one person may visit news, gardening, astrology and self-help sites, for example, while I frequent news, technology and education sites.

It stands to reason - though I have no statistics to support this because the practice is not yet widespread - that people who take online courses will take those courses listed on the sites they most frequently visit. If, for example, I wanted to take a course on XML, I would be far more likely to take such a course offered from one of my regular haunts than I would to search for XML courses in general. And the idea of searching a particular institution - say, the University of Alberta - for XML courses would not even show up on my horizon.

There are some strong caveats to this, of course. I would have to be sure that the course was offered by a reputable institution and taught by people knowledgeable in the field. I would have to be convinced that they would not merely take my cheque and disappear. It would have to be offered at a reasonable price, and at a place and time convenient to me. But these are all factors that emerge after the initial course selection has been made - factors which influence whether or not I select a particular course, and not how I begin my search (if I search at all) for a course to take.

So now - Terry Anderson observes (1997) that "There is huge 'land rush' now in progress between third party portals, seeking to combine and generate courses and student services from many institutions vs. schools who are working in-house trying to build delivery via systems such as WebCT and Blackboard and to integrate these services with registration, student support etc., providing students with a customized view of 'their institution'. In both instances the goal is an integrated 'one stop shopping' approach to life long learning."

Quite right - but if he asks, "What should the University of Alberta portal look like," he is traveling down the wrong road. If he is asking, even, whether the University of Alberta should team up with one of these grocery store portals, offering exclusive access in exchange for brokering services, he is still traveling down the wrong road. While both an institutional portal and a commercial portal will offer some short-term success, neither is likely to be the dominant model for online course delivery in the long run.

The conceptual leap that must be taken - which will be taken first by potential students, and only

later by established institutions - is that the traditional gap that exists between learning and practice must be transcended.

Today, education exists in one sphere - in schools, colleges and universities - while work and play exist in another sphere - in the workplace, job site, or the home. When we decide to learn, we stop our other activities, remove ourselves to some distinct place (and often at a preset time), and for a certain period of time, dedicate ourselves solely to learning. Our knowledge of learning opportunities - courses, programs, and resources - is distinct from our knowledge of work-related or play activities.

But work and learning (especially) and play and learning (to some degree) will converge online. The same site we use to chat with people who share our interests will be the site where we find our research materials, our examples of best practices, and our online courses and programs. We are likely to drift toward a site devoted to - say - gardening, there to chat with our online friends about roses, to look up fertilizer mixes for tulips, to buy seeds, and to take that course in hydroponics.

Such online communities - today misleadingly called "vertical portals" - are on the rise. They will focus on particular topic-based niches. Some will cater almost exclusively to a corporate environment, while others will cater to a person's general interests. In many cases, the two will combine - some people study the history of the Roman Empire professionally, while others merely find it an engaging hobby (and yes, I am a Roman Empire buff).

Traditional educational institutions need to do two things. First, they need to devise mechanisms that will enable their courses to be embedded in the offerings of a vertical portal. And second, they need to study the mechanics of vertical portals to best understand how learning could even fit into such a context. It is not clear that they should actually build such portals (there will be endless complaints that they are reaching beyond their mandate if they take up such activities as selling seeds), but they should place themselves in a position where they may partner with established government and non-government partners.

A more complete metric of exactly how the traditional institution should position itself is probably beyond the scope of this diatribe. But a few observations are in order.

With respect to the development of online learning materials and support systems, the institution must:

- learn how to deliver materials in a distributed environment, where the primary point of interaction is *not* the university site
- learn how to develop and deliver learning materials 'on-demand'
- learn how to produce customized or tailored learning programs for particular corporate or individual clients
- learn how to provide a completely online learning experience (this includes the such things as registry services, books and other resources, testing and grading)
- learn how to promote the authority and trustworthiness of its online course offerings
- With respect to the development of sector specific online communities, the institution must:
 - develop a framework for partnering with non-institutional partners
 - learn how to develop sector-specific resource sites in general

- and how to pay for them without offending their partners
- learn how to structure resource and learning databases so that materials and courses are available on-demand
- learn how to partner with other educational institutions offering courses and programs in the same field (including credit transfers, common registration, etc)

These are just a sampling of the mechanisms required to support sector-specific online learning. No doubt a wide variety of technical, administrative and political issues will emerge in practice. In my own experience - trying to develop a sector-specific learning environment in municipal affairs <http://www.munimall.net> - all of these issues and more have arisen. And as we build this community in Alberta, many more issues - unanticipated issues - will arise.

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I include finally this third paper to conclude the setting of the stage for this volume. It is my first real use of RSS in a paper and expresses what I was trying to do with munimall.ca (which continues to run to this day, albeit without the content syndication). These thoughts were fresh, very fresh, in my mind as I headed Down Under. In one sense, this paper is a report of the failure of MuniMall to meet my expectations, a failure that is analyzed in the work below. But in another sense, it is an explicit recognition that some things worked, and worked very well, giving me sufficient empirical validation to continue. What's important about this paper – and about RSS in general – is that it gets at the relations between individual entities. It is a system described here as a means of syndicating them, and in so doing, is a mechanism for organizing them.

Content Syndication and Online Learning

Written (probably the night before) and presented at NAWeb, October, 2000. Published in [USDLA Journal](#), November, 2000.

This paper divides into two parts. In the first part it defines and describes the RSS (Rich Site Summary) format and its emerging use as a format for content syndication by news and media organizations on the World Wide Web. Through the use of working models and demonstrations, the development, display and distribution of content modules via RSS will be discussed. In the second part, the theories and practice employed by news and media organizations are applied to online learning. Using MuniMall, an online learning community developed by the author, as an example, the method of integrating syndicated content with online courses and learning materials will be described and illustrated.

Part One: Content Syndication

1. Channels and Channel Definitions

If you surf the web using a Netscape browser and followed the 'My Netscape' button to its logical conclusion, you will have encountered a description of something called RSS, or "Rich Site Summary." An RSS file allows a website publisher to produce a on Netscape's site; Netscape users, in turn, may select your channel as one of several channels on their 'My Netscape' page

A channel, typically, looks like this :



Figure 1: Netscape RSS Channel

The idea of a channel is that it is a brief summary of a website or online publication. It is composed of a channel name, a logo, and a set of headlines listing items on the site. Each headline points to a different article or column and may be supplemented with a brief description of its contents.

So far so good, and when Netscape launched its service early last year I was quickly on board with an RSS file of my own. It was a frustrating experience: Netscape's validation didn't work properly and I found myself re-registering over and over with the site's somewhat slow interface. Eventually the wrinkles were smoothed and my Rich Site Summary was accepted into Netscape's interface. Here's an abbreviated version of what it looks like:

```
<?xml version="1.0"?>
```

```
<rdf:RDF
```

```
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"

```

```
  xmlns="http://my.netscape.com/rdf/simple/0.9/">
```

```
  <channel>
```

```
    <title>Stephen's Web Threads</title>
```

```
    <link>http://www.munimall.net/scripts/downes/clist/clist.cgi</link>
```

```
    <description>Stephen's Web Threads</description>
```

```
  </channel>
```

```
  <item>
```

```
    <title>Distance Education vs. Traditional</title>
```

```
    <link>http://www.munimall.net/ /topiclist.cgi?topicid=969550119</link>
```

```
    <description>
```

Does assigning distance students more work make up for the lack of classroom contact? Well, no.

```
    </description>
```

```
  </item>
```

```
  <item>
```

```
    <title>Interview with Presidential Candidate Jackie Strike</title>
```

```
<link>http://www.munimall.net/ /topiclist.cgi?topicid=969464710</link>

<description>

The one-on-one chat with the talking 3-D candidate sets not only a

political precedent, but is a technological first.

</description>

</item>

</rdf:RDF>
```

Figure 2: RSS File

As you can see from the diagram, there are two main elements to an RSS file: the channel definition, and the item definition.

A channel is a set of related items. Items are descriptions of individual articles. A channel may describe items from a single website or items which discuss a particular topic. Items in turn may be anything at all, though typically they are a particular essay, news item, column, or similar chunk of content.

Channels and items each have properties. In the example above, a channel will have a title, a link or URL, and a description. Channels frequently have images associated with them, may be provided by a publisher or website, and may have keyword descriptors. In a similar manner, items also have properties: a title, a link, a description, and perhaps some keywords, author and publisher information.

The idea here is that an RSS file is a structural description of a website or a group of related websites. Because the information is structured, when it is retrieved by a remote service – such as Netscape’s NetCenter – it can be manipulated, displayed in various templates, and made the subject of intelligent searches. But more importantly, for the author of the RSS file, it allows content to be created and published once and distributed and viewed on many different websites. This is the heart of the concept behind RSS and of content syndication generally.

2. *A Wee Bit of History*

Where there is Netscape there is always Microsoft, and it should be no surprise to the reader that the Redmond software company developed an alternative channel format. The Microsoft format is called 'Channel Definition Format' and was introduced in 1997 for its Internet Explorer 4.0 web browser. The specifications were described in the November, 1997, issue of Microsoft Interactive Developer and a software development kit was released.

The idea behind Microsoft's 'Active Channels' was that website summaries could be displayed in the browser itself via a 'channel bar.' For some reason, Microsoft abandoned this feature in its release of Internet Explorer 5.0 thinking, perhaps, that it might incorporate it later as part of the Windows desktop. Ironically, a Netscape version of the channel bar was one of the major features

added to the Netscape 6.0 release in April of this 2000.

Both the Microsoft and Netscape initiatives centered around a set of protocols described by the World Wide Web Consortium as RDF, or Resource Description Framework. The purpose of RDF was to provide a generalized format for online resources; major implementations thus far have included the Dublin Core for publications and the IMS Protocols for instructional materials.

But RSS channels need not be defined in an RDF format. Dave Winer's Scripting News, for example, adopted a non-RDF version of RSS. Started in December of 1997, the Scripting News Format, as it was called then, was launched to introduce the use of XML to news pages. By June of 2000, the Scripting News format had evolved into something called RSS 0.91 - which should not be confused with Netscape's RSS for while Netscape's 'RSS' stands for 'Rich Site Summary', Winer asserts that that there is "no consensus on what RSS stands for, so it's not an acronym, it's a name".

Finally, in August, 2000 (which, by the way, explains why my paper is late), a group of developers adapted the best of RSS 0.91 and re-adopted the RDF format, producing the widely accepted RSS 1.0 specification. This design allows content developers to design and employ "RSS modules" in their RSS files, thus greatly increasing the potential vocabulary and use of RSS files. Content designers can now include, for example, threading, referencing, categorization, and more to the core RSS data set.

3. Syndication

The purpose of creating RSS files is to allow for the syndication of news content. Syndication on the world wide web works in much the same way syndication works in the world of print and electronic journalist: somebody writes a story, it is posted on 'the wire', and somebody else picks up the story for inclusion in their own publication.

On the web, the earliest syndicators of online content were the portal sites such as Yahoo and Excite. The basic idea behind these portals was that a reader could locate information from many sources from a single web site. Syndication on Yahoo has become extensive. The site no longer merely lists headlines; it also prints complete sets of news stories from suppliers such as Associated Press, Motley Fool and Forbes. While attracting remarkably little attention, Yahoo has become the most comprehensive news service on the web.

Syndication can be time consuming and expensive. Content syndicators want mechanisms that allow headlines and articles to be collected automatically. Programs that search through the web - called crawlers - have been around since the early days; the first well-known crawler was WebCrawler. Today, the most popular crawlers are AltaVista and Google.

But these are very generic crawlers and they do not organize their information in any systematic way. That's why they are better known as 'search engines' than as syndicators. Nonetheless, the technology for automatic syndication is essentially the same as for web crawling, and it was only a matter of time before automatic syndication came to the fore.

Perhaps the largest such syndicator is Moreover.Com. . This site collects headlines from 1500 newspapers and content providers around the globe and organizes the results into 280 separate categories. What Moreover has to do is retrieve the headline page from each of these content providers, parse the HTML in order to find headlines and links, and then store these in

appropriate categories. It then outputs a series of RSS files, one for each category. News and information sites around the world use RSS feeds. Providing a similar service is iSyndicate.Com, which enters into content distribution agreements with publishers and provides RSS feeds and complete articles for syndication.

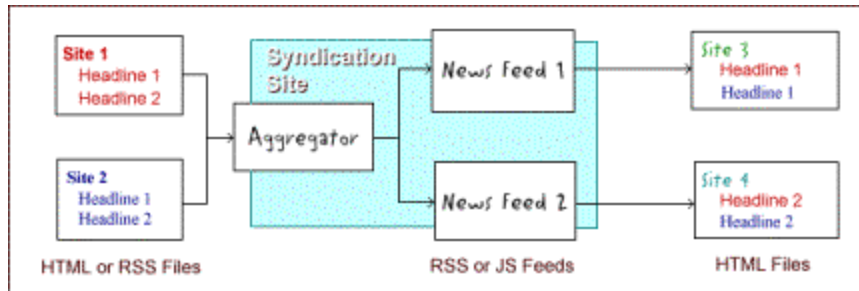


Figure 3: RSS Data Feeds

Pictured above is a flow chart diagramming the syndication process. Original content sites (Site 1 and Site 2) produce headings or content on different topics. The aggregator retrieves this content, which sorts the retrieved content, producing topic based news feeds in RSS or JS format. These news feeds are in turn retrieved by other content sites (Site 3 and Site 4) and are displayed as HTML pages.

Earlier content syndication sites collected content from content providers in the form of HTML pages. This is not nearly so simple as it looks. HTML is not designed to organize content; it is designed to display content. It turns out that it is a lot easier to retrieve and parse XML files - and in particular, RSS files. Sites that do this are called 'aggregators', and today's new breed of aggregators is focusing almost exclusively on RSS files.

RSS was used to good advantage by Netscape, but a major problem with the My Netscape directory was that users could not view the actual RSS files - Netscape would only let readers access the site summaries through its portal. The same was also true of another repository, My Userland, the portal application for the Scripting News Format discussed above. But RSS files may be located through yet another repository, XMLTree.Com, which indexes a wide variety of XML and RSS files. Launched early in 1999, the site has grown over the last year to include thousands of sites sorted by category.

4. Uses for Content Syndication

Although the easiest and most obvious use for content syndication is in the production of relatively current lists of news links on a given topic, RSS developers are beginning to perceive that a wide range of uses will be possible. In a document released in September, 2000, Ian Graham and Benet Devereux suggest the following :

New bulletins or news summaries, currently largely distributed using a simple XML dialect called RSS. An examples of this is My Netscape.

Web site content replication or distribution (often done using tools such as rdist, which is Rdist is a program to maintain identical copies of files over multiple hosts.

Database-related content distribution, such as gathering event calendar data for use in a local calendar.

Gnutella-like file/resource sharing services. This is a serve where multiple copies of the same file (for example, a music video) are located on different servers, with syndication information being used to facilitate retrieval.

Dmoz.org-like catalogues. The Mozilla Open Directory project is a human-created directory of Web-accessible resources. This directory is available as an open -source archive (in RDF), and is integrated into many other Web cataloguing systems (for example, Google or Lycos).

The HEML (Historical Event Markup and Linking) Project . This is a project aimed at creating a world wide collection of history-research related XML resources, with each academic research group being able to create their own resources, which can then be syndicated and distributed amongst the different institutions.

To aggregate proprietary scientific data, as described by David Detlefsen.

As Graham and Devereux point out, in each of these cases, “one organization publishes 'origin' data and makes it available in some form, and another organization downloads the data and processes the data to integrate it in some way into their own database or application.”

Part Two: Content Syndication and Online Learning

5. The MuniMall Project

MuniMall, a project funded by Alberta Municipal Affairs, was intended to provide a common services and information platform for people working in Alberta’s municipal sector. It would provide resources, learning and points of contact to elected officials, municipal administrators, and students of municipal government.



Figure 4: MuniMall Home Page

As such, it was intended to be what has since come to be called an “online community of interest” or “vertical community.” The original design was modeled on the concept of online community as described in Hegel and Armstrong’s Net Gain. At that time, the concept of content syndication

had yet to reach the mainstream; it was envisioned as a portal for all things municipal in Alberta.

Because MuniMall was perceived to be a threat to existing services (and especially websites hosted by the Alberta Urban Municipalities Association and the Alberta Association of Municipal Districts and Counties), the commercial aspects of MuniMall were quickly removed and the website was re-purposed to provide a strictly educational function. To enhance its value as an educational site, MuniMall would include, in addition to resources and links to resources, an online simulation of a municipal website, MuniVille, to act as a training tool.

The removal of the commercial component probably doomed the project to failure: one the one hand, when government funding runs out (as it will in the spring of 2001), the project will be unsustainable. But more importantly, to act as the locus of a community of interest, the site would have had to be able to link to and contain information about all aspects of the community; to draw an artificial boundary around the content MuniMall is 'allowed' to have and that which is not is to limit its effectiveness as a community of interest.

As a research project, however, MuniMall remains invaluable. Unlike most work in the fields of online learning and online community development, MuniMall had an explicit mandate to merge educational content with information and resources used by the community of practice. In other words, MuniMall would be a tool used by municipal administrators in the course of their day to day activities, and at the same time, function as a teaching tool for students in the Government Studies certificate program.

The next three sections will describe three approaches taken to accomplish this.

6. Content Syndication

The first area of integration looked at by the MuniMall team focused on the resources used by both students and administrators. In particular, Alberta Municipal Affairs has over the years developed a Handbook for Municipal Administrators. This handbook contains detailed instructions on how to conduct a municipal election, draft and pass a by-law, approve building permits, and more. The Handbook, in turn, refers extensively to legislation and regulations governing the conduct of municipal affairs in Alberta.

Although an important – indeed, essential – resource, the Handbook was paper-based and not available online anywhere at all. It was maintained, as many similar Handbooks are, as a set of loose-leaf inserts into a massive binder. Periodically, updates would be issued from Municipal Affairs; these updates would be delivered to individual municipalities and also to the Government Studies program, where they would (sometimes) be placed into the binder.

An examination of the Handbook also revealed that it was out of date and in many ways redundant or internally contradictory. The maintenance of the Handbook was a major task for staff at Alberta Municipal Affairs, and the output was of minimal usefulness to practitioners in the field.

MuniMall proposed that the content of the Handbook be placed online and syndicated. Placing the content online would mean that it could be updated online, through a forms processing system, and thus, much of the time and expense in maintenance would be eliminated. Syndication, moreover, would allow the same (always up-to-date) document to be used in a wide variety of locations: and in particular, in online courses, in the MuniMall portal listing, and as

help for any online forms or documents employed by municipalities.

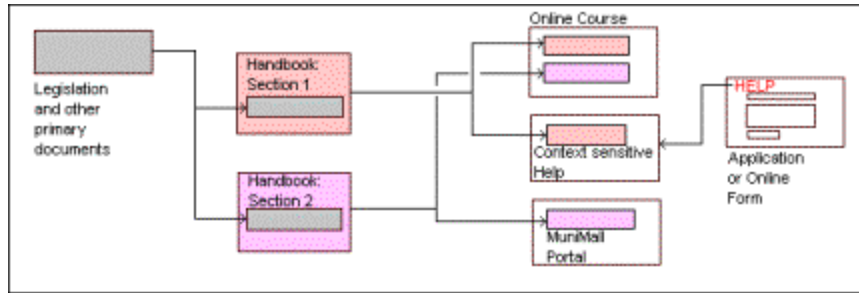


Figure 5: Content Data Flow

In the end, this model of content syndication was never put into place. Several major obstacles emerged:

First, the Handbook was (as mentioned above) in a considerable state of disrepair and would have required extensive revision, a task in which Alberta Municipal Affairs was unwilling to engage (as events transpired, they instead launched an extensive 'Best Practices' initiative which may have as a final outcome a content syndication model as described here). Moreover, Alberta Municipal Affairs had no mechanism for assigning authority or responsibility for the upkeep of the Handbook.

Second, it was not clear that MuniMail, or even Municipal Affairs, could get permission to distribute the content of relevant legislation as described. Copyright over the legislation is held by the Queen's Printer, which currently returns revenues to the provincial government through its printing service.

And third, even were the content available, there was no place to put it. The online course design for the Government Studies program adopted a mixed mode of delivery, with the course outline and discussion occurring online, but with course materials distributed as part of a paper-based package.

A modified version of content syndication was instead employed in the MuniVille to serve as a demonstration of how a similar technique could be employed by local governments for the wide distribution of documents and information. The MuniVille website consists of a set of topical pages, such as 'Industry', 'Recreation' and 'Restaurants'. Content in each of these pages is updated via an online form, and the content is available for insertion into multiple pages. Thus, for example, a real estate agency could draw upon the community website to provide up to date demographic information; the municipal website could in turn draw from a real estate agent's site an index of new listings.



Figure 6: Content Input Window



Figure 7: Content Display Window

7. Link Syndication

As part of its mandate to provide resources and information, MuniMall developed a portal of links relevant to Municipal administrators and elected officials. To date, more than 1200 resources have been added to the portal, with more being added each day. Links are entered into a common database and then displayed in a set of topic-based pages, much like traditional portals such as Yahoo.

The idea behind the link syndication system was to act as a means of accessing resources that could not be stored as web pages on MuniMall itself. The most common type of these resources is the external link; MuniMall staff added a large number of links and MuniMall users were encouraged, through an online submission form, to submit their own links. Three major categories of links emerged: links that dealt with specific municipalities, link which addressed aspects of municipal governance (especially as it related to the provision of online services), and

links that related to some aspect of a community (in other words, links that correspond to one of the topic-based pages in the simulation).



Figure 8: Links Display in a Portal

In order to facilitate this system of link syndication, four systems were developed over-and-above the link submission forms and syndicated output. First, an automatic categorization tool was developed to sort the links as they were submitted. Second, an automatic link-retrieval engine (similar to a web crawler) called Grasshopper was built. Third, a link editing tool was created. And finally, a search tool or “drill” was added to the system.

Although stored in a common database, these link lists are available to multiple web pages. As new links are processed, output files in both RSS and JS are produced (the JS file is a server side Javascript file which can be used by any HTML page without special processing). Thus, the same list of links can be used in the MuniMall portal and also (for applicable categories) in the MuniVille simulation.



Figure 9: Links Display in MuniVille Simulation

The system was originally designed to allow for up-to-date resource lists to be used in online courses as well. Ideally, both students and people working in the field of municipal affairs would submit links. These links would then be embedded in a WebCT course page (using the single-line Javascript command to embed the content).

To date, however, the link system has functioned mostly as a portal. Part of this is due to the fact that the tools are not as reliable as would be liked (the editor, for example, still has some major bugs in it). Part of it is due to the fact that there has not been a consistent and useful flow of content into the system – such a system needs multiple contributors, and more importantly, contributors expert in the field of enquiry. And part of it has been due to the fact that, other than the “today’s links” page and MuniVille, there has been no place to display the syndicated content.

8. Discussion Syndication

As MuniMall was intended to foster an online community, a forum for discussion and communication was essential. To this end, a discussion list program (Allaire Forums) was added to the site, where it sat – empty.

It became apparent that the discussion forum had to be seated much more closely to the main content; indeed, the discussion forum had to be a part of the main content. Once again, the idea was that posts, lists of posts, and list of discussion topics should be syndicated, so that they were available to a large number of web pages.

Because no discussion list program currently offers this feature, a specialized discussion list program was developed and used in place of Allaire Forums. The program – CList – provides output in RSS and JS as well as HTML. In addition, CList, like many other discussion list programs, allows email notification as well (in other words, if the user selects the option, the program will send an email message when somebody adds another post to the discussion).

Discussion on the MuniMall site still languishes; the two threads today have a combined 17 posts. Indeed, the most effective use of CList has not been on MuniMall at all, but rather, on my personal home page, where I used the discussion list program to format and display articles – like this one – on one website, while using the JS feed to list and link to the articles on another one, my main home page. And even in this system, discussion is minimal.

Part of the reason for the ineffectiveness of the discussion tool is the low traffic. Although, starting September 2000, the tool was employed in one of the Online Courses; it is accessed only as an external link, and not embedded in the course content as designed. In addition, on both MuniMall and on my home page, traffic is low, proving once again that a certain level of traffic is necessary in order to sustain a discussion board. Third, there has been no concentrated attempt to foster discussion: no events have been scheduled, no course requirements for discussion, no moderation or introductory articles. And finally, the sort of people who use MuniMall are just the sort of people who do not have time to engage in unfocussed online discussions.

9. Why Things Didn’t Work

I am standing before you and saying that, in three major areas of content syndication, the MuniMall project failed. As I suggested above, perhaps it was doomed to failure in any case because of the segregation of its potential audience. But it also failed as a result of a number of structural flaws. These flaws are worth investigating, especially when placed against an area of

substantial success, yet to be discussed.

First and foremost, I think, an entity like MuniMall cannot exist in isolation. Like any form of syndication, it needs content at the input end, and it needs recipients at the output end. MuniMall suffered from shortfalls on both ends.

Input:

- commercial and provider content was banned from the site almost immediately
- government content, such as the Handbook, the manual, and even web site contents, was not forthcoming
- there is a dearth of subject matter experts (or even knowledgeable participants) providing links, articles, discussion list posts and other materials

Some of this could have been addressed through better management. For example, a coordinated campaign to generate user contributions might have helped. Course professors should have been recruited to provide expert commentary. Students should have been recruited to provide discussion.

But in the absence of the more substantial content – especially content the target audience really wanted, such as business contacts and government documents – MuniMall was bound to suffer.

Output:

- no external sites used MuniMall as a content source

A syndication site that cannot market its materials anywhere is a site which is in deep difficulty. Obvious locations for syndicated content would have included the online courses, community and government sites, and the AUMA and AAMD&C sites.

These problems are indicative of a second and deeper cause for the difficulties faced by MuniMall. The project, from its inception, ran counter to two major features of information networks:

First, the market was just too small. And as Metcalfe's law states that the value of a network increases exponentially with an increase in the number of participants, its corollary, which I'll call Downes's law, states that the value of a network decreases exponentially as the number of members decreases. A variety of factors, structural, organizational, personal and political, led to successive reductions in the numbers of people using MuniMall, and this led to its exponential decrease as a network.

Second, prospective participants in the network didn't participate (in other words, the size of the network decreases), an instance of Downes's second law of networks, which is, that the value of a network decreases exponentially as the size of the network decreases. As the associations, the commercial entities, online courses, and the governments were removed from the network, the value of the network collapsed.

10. A Success Story: The MuniMall Newsletter

The MuniMall Newsletter was launched in September, 1999, and circulation has grown steadily since that launch date (it now stands at 359, about a quarter of the total market population). It is widely read, often printed and distributed in municipal offices, commented upon favorably at conventions and in research studies.



Figure 10: MuniMall Newsletter

The MuniMall newsletter is an example of syndication in action. Published once a week, it contains links to websites and articles of relevance to municipal administrators and elected officials. It draws from oft-ignored sources, such as local newspapers and government press releases, and presents this list of links, each with a short description, as a weekly email message. The newsletter is also published on the MuniMall site, and as Items are added to the site, the “What’s New” page is automatically updated.



Figure 11: What's New Display

The MuniMall newsletter address the two major weaknesses identified in the previous section.

First, it has content. The typical newsletter is a collection of links from external sources and articles produced by MuniMall staff. Moreover, this content is highly filtered, designed to reflect the specific interests of the community it targets. Such highly filtered content is possible only if some form of syndication is employed, whether the process is implemented automatically or by hand.

The Newsletter, in other word, incorporates the first two of the three types of syndicated content described above: it contains textual content, in the form of articles, and it contains resources, in the form of links. In only the third form of content – online discussion – is the Newsletter lacking, though there is every reason to believe that with better content filtering and integration, a discussion component would be a useful addition (as it is in so many list services around the world).

Second, it has recipients. The MuniMall newsletter circumvents the usual channels for syndication, bypassing websites almost altogether, by being placed directly into readers' email in-boxes. Because it is an email newsletter, it is easy to read (people tend to use email a lot more than they tend to use a particular website), and because it provides a list of filtered resources, it is easy to use.

The MuniMall Newsletter thus offers two of the best features of content syndication: content and convenience.

11. All Together Now: Doing Educational Content Syndication Right

What can be learned about content syndication in the educational domain from the MuniMall example?

First, and not trivially: it is technically feasible. Using the tools described in this paper (or tools which are becoming widely available on the internet) any course (or program of courses) or any online learning application can tap into up-to-date resources from remote sources, and tap into them in such a way that content is tailored specifically for the course in question.

But second, and also not trivially: because content syndication requires the development of a network, the practices and politics of building networks must be observed. Especially where the syndication network is breaking new ground (which today, is everywhere), the ground rules and principles of participation must be laid out in advance of any development.

Because, third, a content syndication network needs content, and in an educational setting, it needs authoritative content, which means that the providers of that content – whether they be government agencies, university professors, or professional associations – must be on board and willing to provide that content.

Of course, this is a two-way street: fourth, no content provider can go it alone. The reason for this is clear: in our examination of the municipal sector, we found dozens of agencies which provide authoritative content of one sort or another, agencies such as newspapers, community websites, research institutions, multiple government departments, a dozen professional associations, and more.

Fifth, there must be an audience, which means that at least as much care must be taken to present content in contextually useful situations as is taken in gathering the content to begin with. Even less comprehensive content – such as found in the MuniMall Newsletter – can be widely used if it is presented in an attractive format; conversely, even the best content will not be used if it is not accessible. The mechanisms employed by the Newsletter, including content filtering and a gentle push, tell us what an attractive format is likely to look like.

And sixth, although the temptation is often to start small – a pilot course, a pilot class – in endeavors which depend on a network phenomenon, it is best to start with as large a set of participants as possible. A large network may be scaled back or subdivided if it becomes unwieldy, but a small network may never get off the ground because the interactions upon which it depends are not there.

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- ^[17] Moreover.Com. <http://www.moreover.com>
- ^[18] iSyndicate.Com. <http://www.isyndicate.com>
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This is the paper I wrote in Australia and finished on my return to Edmonton in the spring of 2001. This is an architectural paper – that is, it is intended to describe the major components of a learning resource distribution system. It was adapted as a principle architecture document for one of my projects, peggasus.ca (which launched November, 2003) and outlines the basic mechanisms described in much greater detail in the essays that follow.

The Learning Marketplace - A Concept Paper

Written in April, 2001. Unpublished.

Overview

Online learning involves the delivery of courses and course components via the Internet.

These courses and course components are delivered from an educational provider to a student. Usually, learning objects are created and managed from within a learning management system (LMS) hosted by the educational provider. The LMS acts as the student's primary point of contact with the educational provider, and in addition to delivering course materials, also provides a testing environment and manages the student's course grades. The LMS also may provide interactive facilities such as a discussion board or online chat.

The educational environment depicted by the typical LMS may be described as a 'one to many' relationship between institution and students. That is to say, for the typical LMS, there is only one educational provider and many students who interact with this educational provider. Administrative tasks such as course selection, registration, tuition payment and accreditation are handled externally to the LMS, sometimes by student management systems, sometimes by more traditional means.

This system works well in an environment where one student will take many courses from a single provider, as is the norm, say, when a student is completing a program of studies such as a university degree or college certificate. But as the educational environment becomes more fluid and as post graduates seek to extend their education, we envision a need for a system which may be depicted as 'many to many', that is, where one institution offers courses to many students, and where one student may take courses from many institutions.

To date, support for a 'many to many' model of online learning has consisted of online portals offering lists of courses sorted by course category. And while such course selection portals offer a useful indication of the range of courses available from different institutions, these course portals are passive: while they list online courses, they do not provide access to online courses. In order to participate in online learning, the student must revert to the 'one to many' model for each educational institution.

The purpose of an online learning marketplace is to provide a 'many to many' environment for online learners. Using a single interface, a student may select, register for, and be delivered courses and course components from a number of institutions. The learning marketplace acts as a broker between institution and student, passing information from providers to students, and passing information from students to providers.

Why a Learning Marketplace?

The advantages of developing a learning marketplace may best be described by analogy. Suppose that the learning institutions are similar to food producers (such as, say, Kraft, General Mills or Heinz). And suppose that the student is similar to a food consumer, a person who wishes to purchase food for consumption. Then under the 'one to many' system, each food producer sells food directly to the consumer. But on the 'many to many' system, the learning marketplace is like a grocery store, offering a single point of sale to consumers for products offered by many consumers.

This advantage becomes even more apparent when we allow the consumer to have an account with the seller. In order to purchase food by account from each food producer individually, the consumer would need to establish a separate account with each of them. Each producer would have to perform a separate credit check; the consumer, meanwhile, would have to make and keep track of payments to each of the many food producers. It would take a significant effort for a consumer to purchase food from a new supplier, and it would take a significant effort for a food producer to acquire a new customer.

Under such a system, a food consumer would tend to make purchases from only one or a few food producers. This would force the food producer to provide a wide selection of foods, in order to ensure that the food consumer is able to purchase the desired item. But the food consumer would find the selection overly restricted, because no food producer can produce enough variety to satisfy the individual needs of large numbers of food consumers. And while the consumer may be aware of the existence of other foods, perhaps by browsing through a catalogue, the effort required to make a purchase from a different producer would limit such purchases to all but the most important.

Colleges, universities, and other educational institutions are in the position of food producers selling directly to consumers. They are forced to offer a wide selection of courses and programs to meet their students' varied needs. But even the most adept of them can offer at most a few hundred courses because of the logistics of offering increased numbers of courses. Students, taking courses from a single institution, often find the selection restricted and inadequate to their needs. But the effort required to create an account with a new course provider limits the number of institutions they can work with.

From the point of view of a new institution, the situation is even more difficult. It cannot easily specialize, because it must reach a large number of students in order to become sustainable. It has no place, other than online catalogues, to advertise its courses, and students seeking to take a course from a new institution must overcome a built-in disincentive. This is why, today, large institutions dominate the educational market; there is no easy means for a small or medium sized enterprise (SME) to market and sell its wares.

For the student, then, the advantages of a learning marketplace are clear:

- A much wider selection of learning is available
- Because of the wide range of offerings, a much more personalized listing of offerings is possible
- There is no extra effort involved in purchasing learning from a new institution
- And purchases are made from a single point of contact

- Or, in summary: the student has a better choice of offerings, and needs to take less time in accessing those offerings.
- For the educational institution, the advantages of a marketplace are also clear:
- A much wider audience is available for its course offerings
- The institution can focus and specialize on particular types of offerings
- It is much easier to acquire new students

Or, in summary, the institution is able to reach a large market and therefore to focus on specialized delivery or on extending market reach.

These advantages become even more apparent when we bring third parties into the equation. Suppose, for example, the student works for a corporation and is funded by that corporation for professional development. There then exists a three-way relationship between the student, the corporation, and the educational institution. In the ‘one to many’ model, for each institution offering courses to the student, a separate set of transactions must occur between the institution and the corporation in order to establish billing and reporting procedures.

Under such a scenario, the corporation is likely to select one or a few educational providers as ‘preferred institutions’ and students would be limited to selecting course offerings from those providers. So even if a student wishes to take a course from a different institution, an additional barrier is put into place preventing this transaction, because a relationship between the corporation and the institution must first be established.

And in fact, in today’s educational environment, there are multiple parties involved in course development and delivery. There are students and institutions, corporations and governments, professional associations, standards bodies and certification agencies, testing centers, regional learning centers, educational consortia, and more. When each course offering to a student requires a multitude of bilateral agreements, a significant disincentive exists against any change or development. Course selection is severely limited. And course enrollment is cumbersome and slow.

Creating Course Offerings

We now move into a description of the mechanics of a learning marketplace in order to describe how such a system would work. While this description is necessarily speculative, it draws on developments already taking place in the field of online learning. The purpose is to show that a learning marketplace is feasible and to suggest how it would be structured.

In order for there to be a marketplace, there must be a product. In the case of a learning marketplace, the produce consists of learning opportunities. We have assumed in the discussions above that these opportunities would consist of online courses, but there is no need to be so restrictive. Learning opportunities may come in a wide variety of sizes and delivery modes.

To see this, we need to distinguish between the learning opportunities themselves and the descriptions of the learning opportunities. Think of the former as being like the contents of a can and the latter as the label on the can. In a grocery store, a purchaser looks at the label of the can in order to decide whether to purchase the contents. From the point of view of the grocery store, the can may contain anything at all; what is important is that the label provide certain information to the customer. Indeed, the contents of the can are completely untouched by the grocery store. The

transactions between the store and the producer, and the store and the consumer, are based entirely on the label.

A similar situation exists in a learning marketplace. For each educational offering there is a corresponding label. The label describes the contents of the educational offering. The marketplace displays this label to the student, and on the basis of the label, the student decides whether or not to purchase the contents. Upon paying the grocery store, the store delivers the label to the consumer. Of course, what is important here is that the label is attached to the contents, and that the label accurately describes the contents.

In the terminology of online learning, the combination of a can and its label is called a learning object. The label itself is called the metadata describing the contents of the learning object. The learning object may be anything at all, so long as the label accurately described the contents, and so long as the label is attached in some way to the contents.

In grocery stores, certain standards have evolved regarding the labeling of cans. Consumers expect, for example, to find the name of the producer, a title or brand name, a description of the can's contents, the price offered for the can, usage or shipping instructions, expiration date, seals or certificates of quality, and recommended use. Some of this information is contained in a Universal Product Code (UPC), the bar code scanned by the grocery store on checkout.

The metadata for learning objects must also be machine-readable; this is what allows transactions to be automated. The machine-readable code for learning objects is written in a language called XML. The vocabulary for that language is expressed by learning management systems such as IMS or SCORM. The details of IMS and SCORM are unimportant at this point (moreover, these vocabularies are in transition and are too limited for a learning marketplace; it is impossible in IMS for a provider to specify a discount for government employees, for example) but the mechanism is important.

For each learning object that an institution wishes to offer for sale, a corresponding set of metadata must be created. From the point of view of the institution, this is like filling out a form with the required values.

The form consists of two sets of elements: the name of a field and the value of the field. The name of the field is a word in the IMS vocabulary, such as "author". The value is the actual value for that learning object, such as "Fred Smith".

These names and values are stored in a database located at the learning institute. Thus, for example, the University of Alberta would have on campus a database consisting of all the courses it wishes to offer for sale through a learning marketplace. This database is connected to a web server. When a remote user accesses the web server, the server retrieves the information from the database and presents it to the user as IMS compliant XML files. The content of the XML file corresponds to the content of the database.

In order to list a learning object, a learning marketplace system connects to the institution's web server and requests that it send the metadata. This transaction happens completely automatically; the learning marketplace computer program automatically connects to the institution's web server at predetermined intervals of time (this is known as polling).

Some filtering may occur at this stage, since there may be no need for the entire database to be

transmitted to the learning marketplace. The learning marketplace may access the database using a search procedure, thus retrieving only a certain set of records from the database. A learning marketplace that focused on geology, for example, would retrieve metadata only for geology courses. Moreover, the educational institution may also filter its results. For example, it may quote different prices to different learning marketplaces. Or it may make only a subset of its courses available to certain learning marketplaces. These are policies determined individually by each learning marketplace and each educational institution; these policies are determined autonomously and implemented locally.

The resulting XML file is thus transported automatically to the learning marketplace where it is parsed and stored. More filtering may occur at this stage; the learning marketplace may wish to store only a subset of the information provided by the educational provider. In addition, the learning marketplace may add some information at this point. For example, it will add information about when the file was downloaded from the educational provider. It may also add information about the provider which may not be in the provider's database, such as the name of the provider, its geographical location, or its user satisfaction ratings.

The learning marketplace then stores the information in its own database, ready for display and distribution as needed to prospective students.

Some systems exist which almost perform this function. IMS compliant repositories of learning object metadata already exist. For example, MERLOT collects information from member providers and displays the results in HTML or XML format. However, MERLOT does not poll member institutions for metadata; staff at each institution must submit the information using an online form. This means that for each learning marketplace, staff would have to complete an additional form for each learning object, an obviously cumbersome procedure. In addition, MERLOT collects metadata only from member institutions, thus limiting the number of course offerings available to prospective students.

No learning marketplace is obliged to list offerings from all educational providers, just as no grocery store is obliged to stock cans of food from all food producers. Learning marketplaces can and will determine which educational providers they will poll for information. This list is contained in a secondary database in the learning marketplace and includes not only the address of the institution to be polled but also the exact request that will be made of the institution's database.

Some learning marketplaces will charge fees for inclusion, as MERLOT does. Other learning marketplaces may charge for exclusive listings in certain product areas, just as a grocery store may charge Kraft if Kraft wants to be the only producer selling peanut butter at the store. Other learning marketplaces may charge producers for premium placement of their product, just as Safeway extracts a discount from Heinz for an end-of-row display of Heinz Ketchup. These policy decisions, must be balanced against the marketplace's usefulness to the student. The value of the marketplace to the student is created by offering choice and convenience, and this value is diminished by any exclusive agreement restricting choice and convenience. If a store only offers Heinz ketchup, fewer people will shop at the store, reducing the profit earned by the store (and not incidentally, its value to Heinz as a distribution agent).

Creating the Offer

Once a store is stocked with product offerings, its next major task is to create a mechanism for

customers to view and purchase those offerings. In a store, the products are clustered by category and arranged on shelves, labels facing outward. Aisles are created to allow the customer to view the offerings and shopping baskets are provided to allow customers to collect the desired products. Near the exit of the store, cash counters are provided where the objects are scanned, a bill presented, and payment made, thus completing the exchange. Some stores also provide delivery or other post purchase assistance.

The dominant model employed by grocery stores is the browse model; this is the model employed by online course portals today. Products are clustered into categories, and prospective purchasers are invited to walk through the aisles and view a selection of individual products for each category. Thus, the aisles of a store are labeled in much the same way as the sections of a course portal: there is a pet food aisle, a pasta and sauces aisle, a meat aisle; and there is a biology aisle, a geography aisle, and a mathematics aisle.

The problem with the browse model is that the customer must know how the store categorizes its products in order to locate a certain type of offering. Is Heinz ketchup located in the sauces aisle, for example, or is it located in the condiments aisle? Often, stores will provide multiple product placements (putting ketchup in both sauces and condiments, for example) and will sometimes provide associative placement (putting ketchup where the meat is sold, for example). But even with these innovations, customers nonetheless must spend a fair amount of time browsing, especially if they have specific needs, and there is a certain risk that they will never find the desired product at all.

Stores are aware of this and attempt to interpret their customer demographics in an effort to minimize browsing. During certain seasons of the year, for example, a store may offer 'barbeque kits'; knowing that a certain percentage of shoppers will arrive at the store in early July looking for charcoal briquettes, steaks, steak sauce and lighter fluid, these products will be grouped and placed at the entrance to the store during the summer months. In winter, these displays are replaced by collections of wrapping paper, take, ribbons, and popular gift selections. Department stores generally place men's wear items on the main floor exit based on the perception that men are more likely to value convenience than selection; the women's wear is further inside the store but offers much more choice. Stores also record consumer purchases – this is the purpose of affinity programs such as Air Miles or Club Z – in order to determine shopping patterns and product clusters, again in an effort to minimize browsing.

Online course portals provide none of these conveniences. This is because the user of an online course portal does not fit into a certain demographic (except, perhaps, the desire to purchase a course offering). Because the actual shopping occurs outside the course portal, it is not possible to create affinity programs or detect purchasing clusters. Indeed, the online course portal knows almost nothing about the purchaser, and so is forced to rely almost exclusively on the browse method, inconvenient though that may be. And as the number of online course offerings increases, the browse mechanism becomes increasingly unwieldy. This is alleviated to some degree by a search mechanism, but as web users have learned, in an arena where there may be tens of thousands of offerings, the search must be very specific.

In the retail arena, this is mitigated to some degree by the segmentation of specializations. No store (except maybe Wal Mart) sells everything; stores will focus on a certain market niche in order to reduce the browsing required by potential customers. A similar trend is beginning to happen in online course portals, where a given portal may list courses only law courses, say, or only computer courses. But this trend is still a stop-gap. In a global education market, there may

be tens of thousands of courses in a certain field, thus reproducing at a lower level the same sort of difficulties in searching. Moreover, a new difficulty is created: that of locating the appropriate specialty course portal. A portal of portals is required, but without being able to scan the contents of each individual portal, browsing becomes even more hit and miss.

The learning marketplace circumvents many of these difficulties by creating individual profiles for each potential customer. In addition, by handling the transaction as well as the offering, the learning marketplace is able to learn the sort of offerings that may be appealing to the potential students. It is likely that niche learning marketplaces will be created; for example, a professional association may create its own learning marketplace. But these niches will be based on some similarity among the customers rather than on some similarity between the products offered.

This latter distinction is important. No person buys products from only one store; at various times, a person may need shoes, food, computers, art supplies or talcum powder. Thus if products are grouped according to product type, consumers will still have to shop at many stores. However, if products are grouped according to consumer type, then stores can offer a wide range of product types, but product types which are typical of consumers in that demographic.

Such stores exist, although because consumer types tend to be geographically distributed, they are less common. Nonetheless, at a university we will find stores specializing in the purchasing needs of students: such stores will stock pens and paper, binders, school jerseys, caffeine tablets, snack food and newspapers. Such a clustering of products makes no sense downtown, but makes eminent sense in the Student Union Building. A general store at a beach will display a certain sort of clustering, offering towels, sunscreen, paperbacks, souvenirs and beach balls.

Thus a learning marketplace can refine its offering in two major ways: it can create demographic profiles of each of its users, and it can cluster a group of users by user type. Thus, we envision a multitude of learning marketplaces, each developed or sponsored by a professional association or some similar affinity group, in which members share a set of common interests with other members, and obtain personal characteristics by means of a personal profile.

Customization and Personalization

In order to arrive at a description of the offers that will be placed in front of individual prospective purchasers, it is necessary to discuss the means by which these offers are tailored for each individual. There are two major mechanisms, known respectively as customization and personalization. Here we adopt a terminology that has become common in the field of enterprise portals.

Customization is individualization performed by the portal or online service. For example, if a person elects to purchase a Beatles album, a music purchasing portal may then recommend albums by similar artists (such as the Kinks or Klaatu). If a person reports that he lives in Montreal, then he may be offered Montreal Canadiens merchandise instead of the more popular Toronto Maple Leafs merchandise. Customization occurs when the online service detects some feature of the individual and proposes product offerings associated with that feature.

Personalization is individualization performed by the individual user. For example, if a person enters his name as 'John Smith' and the service greets him by saying 'Hello John,' this is an example of personalization. Or if a user requests to be shown new books by Stephen King, then a placement of *The Stand* on a list of offerings reflects personalization. If a person has already

purchased The Stand, then this book is not displayed among the personal offerings. Personalization reflects a user's tailoring of his or her own environment and is necessary because customization can at best reflect group demographics, and never individual demographics. Personalization can be explicit, that is, the result of some direct action by the user (such as selecting a background colour) or implicit, that is, the result of some other action of a user (such as the purchase of a particular product).

Customization and personalization are affected not only by user demographics but also by events external to the user. For example, if an educational institution releases a brand new course offering, then this course is more likely to be displayed than an older course offering. If the individual is sponsored by a certain company, then courses favoured by that company are more likely to be displayed than courses not favoured by that company. The exact listing of courses for any individual on any given display will be the result of a dynamic interplay between user actions and events and external actions and events.

The exact details will vary according to a wide variety of parameters but the mechanics will be similar in every case. For any user at any time, there are two sets of variables:

The set of offers which may be displayed (in a learning marketplace, the set of learning offers which may be displayed)

- The number of offers which can be displayed
- This latter feature is the limiting variable. For all practical purposes, only a limited number of offers may be displayed on a screen at any given time. A listing of ten thousand courses is not useful to the prospective purchaser (nor, for that matter, is a listing of only one course offering).
- The number of courses that may be displayed is subject to several variables:
- The mode of access – it is possible to list more courses on a broadband web browser than on a wireless PDA

Limits set by the user – the user may elect to see more or fewer options. The user may subselect, effectively filtering the offers displayed (today the user is interested only in customer services courses, while tomorrow he may select from a more general list of courses)

The number of courses available – obviously, the marketplace can only display available courses; if the number of providers is limited, or if the topic area is very specialized, then only a few courses will be available for display

Out of ten thousand course offerings, then, only a small number – say, ten – may be displayed on the screen at any given time. The actual ten to be displayed are determined by two major factors: filters and preferences.

A filter is a mechanism that eliminates from consideration a certain number of courses based on course information and user data (as expressed by customization and personalization). The most common filter is the search function; only those courses that satisfy the search parameters are candidates for display; the search process filters other courses. But in addition to search, a number of other filters may come into play, for example:

- Mode selection – a user may elect to view only online courses, for example

- Platform selection – courses which require a MacIntosh platform are not displayed to a user using a Windows system
- Accreditation – a user may elect to view only certified courses
- Funding Limitations – the user may elect to view only courses funded by the employer
- Pre-requisites – A user may not be qualified to take certain courses, or may require formal admission to an institution before taking certain courses

Filtering may dramatically limit the number of candidate courses, but depending on the display limit, more refining may be necessary. This refining is accomplished by means of preferences; the purpose of a preference is to sort the candidate courses from the most preferred to the least preferred. Each candidate is assigned a preference weighting; customization and personalization features determine the preference weighting. Preferences may be defined by the learning marketplace, the user, or by external agencies, such as the user's employer.

For example, higher preference may be given to courses that:

- Are newer
- Are from a provider that provides discounts to the employer
- Are associated with recently completed courses (for example, have a recently completed course as a pre-requisite)
- Are Canadian
- Are three hour courses (as opposed to three week courses)
- Have higher student evaluation ratings

Each candidate course remaining after filtering is thus assigned a preference value; those courses with the highest preference value are displayed first, up to the total number of courses which may be displayed as determined by the number of offers that can be displayed.

The preference selection is enabled by a sequence of operations performed on the contents of a set of databases. In a relatively simple example, the databases involved are as follows:

The Course Offerings Database – this is the database created by the learning marketplace as a result of polling the various educational providers. This database contains information about each course on offer, thus providing values according to which preferences may be assigned.

The User Database – this is the database created by (and about) the user in question. This database contains normal demographic data (such as the user's name, age, profession, and location). The user database also contains links to other databases. For example, the user database will list the user's employer; this is a signal to the system to take into account the employer's preferences. The user database will also contain historical information about the user, for example, those courses already completed.

The Session Database – this is a dynamic database updated each time a user logs on for a new session. This database includes information about the user's mode of access (eg., desktop browser or wireless PDA), current location, and session-specific variables (such as search parameters or category selection)

The Employer Database – this includes global information about the employer, such as the employer's name and billing address; it may also contain marketplace-specific information, such

as a list of those courses it is willing to pay for, or those certification agencies it is willing to recognize. The employer database may include subsections for individual employers, thus allowing, say, one type of employee to enroll in management courses while directing other types of employees to technical courses.

The Preferences Database – this is a list of all candidate courses and preference values for each course, based on values obtained from the other databases

The actual list of course offering, therefore, consists of a set of operations over the contents of these databases. For example, it might look like this:

For each candidate course:

- assign it a preference of 10
- if it was released in the last week, then if the user has assigned a preference for recent courses, then add 10 to the preference
- if it is certified, then if the certification agency is preferred by the employer, add 10 to the preference; otherwise, subtract 10 from the preference
- if it leads to a degree selected as an objective by the user, add 10 to the preference
- if it is available online, and if the user has indicated a preference for online courses, add 10 to the preference
- and so on, until:
- write the resulting preference value into the preferences database

Presenting the Offer

The presentation of course offerings consists of two types of display: the list display, and the object display. In the list display, a course is displayed as one of a list of courses; in the object display, the course is displayed by itself. Think of the list display as being like what you see when you see a row of cans on a shelf, and an object display as what you see when you take a can from the shelf and look at the label.

In the list display, a certain, restricted, set of information is displayed to the user. Three major factors determine what information is displayed:

- Information deemed essential by the learning marketplace (for example, the learning marketplace may require that course titles always be displayed)
- Information deemed essential by the course producer (for example, the University of Alberta may require that the course instructor always be displayed)
- Information selected by the user (for example, the user may require that the price always be displayed)

It is important to keep in mind that the list display may be provided to the prospective student in a variety of formats. Of course, the student may obtain the display any time by logging on to his or her learning marketplace home page. Or this information may be coded in RSS or JS format and embedded into some other web page, such as the student's association web page or corporate desktop. Additionally, the list may be compiled and sent as a weekly email reminder. Or it may be formatted into WAP or some similar wireless protocol and made available as a wireless web page or instant message.

The user moves from list view to object view by clicking on the link for a given course object from the list provided (the user may alternatively elect to see more of the list by selecting the 'more' option, or may elect to recreate the list by entering search or other parameters).

In the object display, all relevant information about the course is displayed. The contents of the object display may be determined by the same factors that inform the list display. Additionally, the learning marketplace may at this point introduce new information. So in addition to seeing relevant course information, the user may also be able to:

- Read reviews of the course from previous users
- Enter a discussion forum held by students in the course
- Search all discussions for references to the course
- Contact the educational institution for more information

Having reviewed the course and having decided to take the course, the user may then elect to purchase the course. A link is provided on the object display for this purpose, at which point the student enters the transaction phase.

- The Transaction
- The transaction consists of three essential stages:
 - Entrance into the course
 - Work during the course
 - Completion of the course

In this section we consider only the first of these three stages. The entrance into the course consists of two essential components:

- Course registration
- Course delivery

In the first component, the user applies for and is granted admission to the course in question. In the second component, a transfer of educational materials (the course contents) occurs between the educational institution and the student.

In order to complete course registration, a series of transactions must be completed involving the exchange of information between the student, the educational institution, and any third parties which may be involved, such as the funder. Generally, the registration consists of the following steps:

Admission into the institution – many institutions restrict admission into certain programs of study based on the qualifications of applicant. The mechanics for admission into each institution vary and there is often a delay as applications for admission are evaluated manually. Two possibilities occur here:

- The student has been previously admitted. In such a case, the learning marketplace will provide the institution with the student's institution-specific identification, such as a student number
- The student has not been previously admitted. In such a case, the student is transferred to an admission subroutine. With the student's permission, demographic information and

required documentation is provided by the learning marketplace to the institution. The learning marketplace automatically generates transcript requests. Upon acceptance of admission, the institution transfers the student's institution-specific identification to the student directly or to the learning marketplace, depending on expressed preferences and institutional policies

As mentioned before, the admissions process is often not automatic and there may be a delay at this stage. It is important for a learning marketplace to enable automatic application for admission, but whether that is possible will depend on the educational provider. Institutions will be encouraged to enable automatic admission as those that don't will see prospective students go elsewhere.

Ideally, courses from institutions where a student is not admitted, or could not be admitted, will not be displayed (or will have a very low preference).

Admission into the Course – assuming that the student is admitted into the institution, the institution must determine whether the student will be admitted into the course. Several factors may affect course admission, including course pre-requisites and the number of seats available. Provided that the student has an institution-specific identification, the institution should be able to determine whether the student may be admitted to the course; again, however, not all institutions will make this available automatically. However, the learning marketplace should make automatic admission possible, though whether automatic admission is available will depend on the institution. As above, institutions which do not permit automatic admission to courses will find students seeking courses elsewhere.

Presentation of Admission Information – assuming that institutional and course information are automated, the student will then be presented with admission information. Such information could include, say, a start-date for synchronous course offerings, a room and building location for in-person courses, tutorials available, required texts or online resources, total costs, and other course specific information. The student at this point has the option either to accept the admission as presented or to decline the admission.

Acceptance and payment – upon electing the accept option, the transaction is concluded with the payment of fees. Depending on the user, the institution, and third parties, such as the user's employer, one of several outcomes may occur:

- The student is funded by the employer, in which case, upon acceptance by the employer (which may be automatic), the employer will be billed by the institution
- The student must pay directly, at which point a credit card payment subroutine will be invoked

In either case, this transaction occurs via the learning marketplace. That is to say, the student or employer pays the learning marketplace, and the learning marketplace pays the institution. This is necessary for the following reasons:

- The marketplace may extract a percentage of the course fees
- The employer is billed by a single entity, and receives a single invoice, thus simplifying its accounting procedures
- The institution receives money from a single source, thus simplifying its accounting fees

Placement into the course – once the financial transaction has occurred to the satisfaction of both the student and the institution, the student is placed into the course. Again, it is preferable if this happens automatically, because the institution may then provide course-specific information to the learning marketplace. Minimally, the institution should provide (a) the online access point to the course, if it exists, and (b) logon or other course-specific identification.

This allows the learning marketplace to place current course data into the student's database. If a student is currently registered in a course, then access to the course may be provided through the marketplace. Thus, the student is able to access all his or her courses, no matter who the course provider, from a single point of contact.

The transaction is the most critical component of the development of the learning marketplace. As insisted in several points above, it is desirable that the transaction be as automated as possible. Just as Heinz is comfortable in allowing a consumer to select and pay for a jar of ketchup at the grocery store, so also educational institutions must be comfortable in allowing a student to sign up for and pay for a course through a learning marketplace.

Thus, in the development of a learning marketplace, it is essential that protocols be developed which enable such automatic course registration. This involves a certain amount of political work, as institutions tend to keep a tight reign on admissions and registrations. And it requires a certain amount of standards and protocol development, as the learning marketplace must speak and listen in a language understood by university computer systems.

Course Delivery and Completion

In most cases, the only role played by the learning marketplace in course delivery will be to provide a point of access to the course from the user's learning marketplace home page. On selecting the course, the learning marketplace may send login information to grant the student quick access to the course, though this may vary according to user and institutional priorities.

Some interaction between the marketplace and course providers may occur. For example, the learning marketplace may poll the course provider on behalf of the student. It may, for example, request any course announcements of immanent deadlines. These announcements may then be relayed to the student either via their learning marketplace home page, via email, or via wireless instant message.

Otherwise, the learning materials are delivered directly from the institution to the student. This is important because different institutions may use different learning management systems – one may use Blackboard, while another may use WebCT. Or the learning materials may be customized application, such as Java Applets or downloadable programs.

Only when the student has completed the course (or when the completion date has expired) is the learning marketplace again involved.

Upon course completion, the relevant information is then delivered from the educational institution to the learning marketplace. The learning marketplace in turn relays this information to the student, and with the student's permission, to any relevant funders or certification bodies.

Third Parties

A number of third parties – institutions other than the student and the educational course provider – are involved in a learning marketplace.

Foremost of these is the entity that operates the learning marketplace. As mentioned above, learning marketplaces are intended for certain types of students. A learning marketplace, for example, may be constructed for members of a professional association, or for people who work in a certain market sector. Indeed, learning marketplaces will often become essential components of a sector specific or interest based online community, being one of the range of services offered to members by that community.

The learning marketplace operator has three major tasks:

- The selection of educational institutions that will be allowed to provide course offerings through the learning marketplace
- The recruitment of additional third parties who may play a role in the offering and purchase of educational activities, and
- The recruitment of a body of students who are potential customers for those course offerings

As mentioned above, the learning marketplace operator may elect to be as open or as restrictive in the selection of educational institutions and course offerings to be included in the marketplace. Generally, it will be preferable to include offerings from as many institutions as possible, but in a limited range of topics as possible. This provides potential students with maximal selection with minimal browsing.

As the operator of an online community, the learning marketplace will need to establish a relationship of trust and interaction with its members. As mentioned above, the learning marketplace should be one of an array of services offered to members. The online community should provide a forum for member interaction, should be a locus for industry related news and information, and should serve as a marketplace for other sector specific goods and services. While specialization in the definition of membership is desirable, specialization in the range and type of services offered is not.

Other third parties will be those entities affiliated in some way with the members of the community and especially as regarding the members' learning interests. Some key third parties may be identified:

Employers – employers will often play a role as interested third parties in a learning marketplace. Employers serve two major functions: first, they may guide some members (either current or prospective employees) in the selection of appropriate learning for employment, and second, they may provide funding for some employee learning.

Employers are likely to interact with the wider community in a number of other ways. An employer will find a sector or association specific community an excellent location for recruitment or subcontracting. Employers may also elect to advertise goods and services to members of the community employed with other companies.

An employer interface to the learning community specifically will consist of a set of preferences and filter protocols. As described above, employer preferences may determine which courses are offered to prospective students at all (assuming the prospective student has the employer filter

turned 'on') and employer preferences may affect the placement of course offerings on a student's learning marketplace home page.

The employer may also exchange information about the student (with the student's permission). For example, an employer may wish to be notified of completion of a specified course which it has funded; it may be interested in funded or unfunded courses completed as part of the employees overall profile (which may in turn be used as part of the expert-detection function in the employer's own knowledge management system).

Employers may also play the role of educational providers. An employer may elect to provide course offerings to prospective students both inside and outside the company. It may be worth while, for example, for an employer to offer free or low cost company specific training to prospective employees; this reduces the cost of training on the job, and also gives the employer better data when making hiring decisions.

Certification Agencies – there are two major types of certification agencies that may be involved in a learning marketplace. On the one hand, there may be agencies that certify course offerings. On the other hand, there may be agencies that certify individual competencies.

Agencies that certify courses – provincial government departments of education, for example – may be invited by educational institutions to review and accredit course offerings. Such certification agencies would then report course certification information in much the same way educational institutions provide course metadata. The learning marketplace, after loading course metadata from educational providers, would then poll certification agencies for information about the courses listed; this certification information would then become part of the course record on the learning marketplace.

For any given course, many certification agencies may come into play. Some courses, recognized by the provincial government, may also be recognized by, say, Microsoft as being a standards compliant course. The same course may also be recognized by a professional association as being eligible for completion of a certification. And the same course may also carry a stamp of approval by an unaffiliated user group.

The learning marketplace managers, since they control the polling of certification agencies, have the responsibility over deciding which agencies to poll and which to omit. Of course, such a decision is best made in consultation with members of the community.

Agencies that certify individuals (as, say, being eligible for a certification) may wish to interact with the learning marketplace for information on course completions. An individual who desires a professional certification may register this desire as a user preference, at which point the certification agency preferences come into play in determining the list of offers available to the student. Moreover, with the student's permission, that agency may be notified of course completions, thus enabling it to recognize an individual student's satisfaction of the requirements for certification.

While I was in Australia I was able to watch students and radicals protest the University of Melbourne's signing with Universitas 21, a commercial consortium that almost seems to exemplify the sorts of complaints posed by people like David Noble and Steve Eskow. But while I have a lot of sympathy with such complaints the appropriate response is not to combat them with ineffective methodologies and technologies. In a world of autonomous agents, options and choices, the rigid authoritarian structure of the university system and academia is no longer appropriate, and if we are to embrace our goals of liberty and diversity, then the new technology – which is designed for that purpose – should be employed to those ends, not rejected out of hand. This is a theme I return to a lot – the use of new technology to accomplish objectives that make sense only in a world of universals and hierarchies. Anyhow, if this article seems a bit strident, it is because I am expressing frustration about dealing with the old issues well after having engaged the new issues considered here.

Cutting the Throat of the University

Written August 7, 2001. Published as [Unrest in the Ivory Tower: Privatization of the University, USDLA Journal](#), October, 2001.

Academics must resist the trend toward the commodification of education, claims Steve Eskow, or universities will become privatized. On the contrary: the more professors resist, the greater the likelihood that privatization will happen, and that would be a tragedy.

Introduction: Mensa and Academia

I once had a desire to join Mensa. I'm bright enough; their IQ tests are pleasant diversions but no real challenge. And I enjoy hanging around with bright people, as I have for the two decades I've spent in an academic environment, quaffing a few fine ales at Dewey's or Dinnies Den, debating matters far and wide of varying degrees of importance.

As I learned more about Mensa, however, disillusionment set in. While one would have thought that society's brightest minds were focussed on the pressing issues of the day, these minds were focussed most of all on puns, word games and clever tricks. By comparison, even my regular trivia games have more merit. And my sudsy sermons Pulitzer prose.

Over time I have become less enamoured of the university environment for similar reasons. Not that universities even approach the banality of Mensa; the people across the road continue to amaze (islet transplants, fun with phage cancer treatments, human livers in mice...) and the university is recognized - here, at least - as the city's key economic engine. But university professors can and do obsess over the minute. They can put their own momentary comfort over the needs of academia and society. And they can be as self-absorbed as the most narcissistic Mensa meeting.

I say this lovingly, of course. Nobody spends two decades associated with institutions and people they despise (or even dislike). Twenty-first century academia is a treasure, one of humanity's shining pillars of achievement. It is worth saving, or at least, spending a few hours on a Tuesday morning talking about how it may be saved.

Eskow's Hypothesis

I now turn to Steve Eskow's interesting words:

Hypothesis: There is a growing movement afoot in the US and elsewhere to use distance education as one of the knives to achieve the dismembering, and the death, of the university. It is often unconscious, as in John Hibbs's quote, but one does not have to be a Freudian or a literary critic to detect one of the organizing patterns of this death wish.

It is often disguised--hidden from the speaker or writer--as a desire to "improve" the university, to make education "more affordable" and "more efficient." I'll call it THE PRIVATIZATION SCENARIO.

It is a pattern, easily detectable, in that it plays variations on the theme of privatizing education on the grounds that the "market" is a more efficient guarantor of quality than the "elite" guild of academics who are more interested in protecting their own turf, etc., etc.

How typical that Eskow's own words indict him. I most certainly agree with his hypothesis: that there is a movement toward privatization. But if Eskow would poke his head beyond the ivy-lined campus windows, he would see that the privatization movement encompasses all of learning, not only universities. The move toward charter schools, home schooling and various alternative education projects highlights this trend in the elementary sector. Trade schools and colleges face increasing competition from private institutions.

Moreover, it is not only the institutions of learning that are being privatized. Their product: the books, journals, ideas and opinions produced by professors and their ilk are being increasingly placed under corporate lock and key, whether they be through funded research or collected in fee-based archives such as XanEdu. Patents and copyrights are moving the learning that used to be freely circulated in the public domain into a closed marketplace of privatized knowledge.

Universities and especially university professors are easy targets precisely because, like Mensa members, they become self-absorbed. Part of that comes with the territory - you cannot be expert at anything unless you become a little fanatical - but part of it comes from a blindness, an inability or unwillingness to look at some wider trends sweeping society, trends that have the potential to sweep the university system with them.

So let's subsume the 'privatization hypothesis' under this larger picture, the one in which human knowledge itself is being privatized.

Why Defend Universities?

As I mentioned above, I am a defender of the university. Perhaps you may not believe that, given my staunch defense of distance and online learning, and given my occasional carping about universities and university professors. But I am a defender of the university because I am a defender of knowledge, and in particular, that view of knowledge where it is a public trust, intended and to be used for the benefit of all of humanity, freely shared and freely used.

If we were talking about money, not knowledge, I would be classed as a socialist, perhaps even a Marxist or communist. I am not sure whether there is a corresponding term for the public ownership and free distribution of intellectual capital (I may as well take yet another stab at

historical significance and call it Downesism). Whatever it is, it is that that I support; my support for the universities is as a means to this end.

This is important: universities are not worth defending in and of themselves. They are worth defending only insofar as they foster the free distribution of knowledge, whether it be by means of allowing people an affordable education, whether it be by means of discovering and announcing fundamental truths, or whether it be by means of advancing our science, technology and human sciences for the good of society as a whole.

Knowledge is different from capital, and from material goods, in that there is no inherent scarcity to knowledge. A piece of knowledge, once produced, may be replicated almost for free, distributed around the world in the blink of an electron, fed almost as easily to one person as to one billion people. Oh sure, there are some pragmatic issues: knowledge can be expensive to create, and as those of use involved in distance and online learning will attest, distribution is not free. But for the greater good people in a society - and across societies, in a global society - pool our resources, funding public universities for the production of knowledge, and a public education system for the distribution of knowledge.

We allow and accept a market system for the distribution of knowledge where it is appropriate. We recognize that a person owns his or her own ideas, and that the inventors of new technologies have the right to profit from their work. We allow that money may be exchanged for knowledge. So long as the objective - the widespread creation and distribution of knowledge - is met, we can allow a multiplicity of methodologies. And just so society today has created great public universities, great private universities, public-private collaboration, government sponsored research, and corporate research. When we look at the intellectual achievements of the twentieth century, we regard not only M.I.T, Harvard and Stanford, but also Xerox PARC and Texas Instruments, NASA and National Geographic.

Now Steve Eskow is concerned about the privatization of universities. He argues that the privatization of universities is being accomplished via a set of processes and paradigms that I will look at below. And so it is true: these processes and paradigms are being used as the thin edge of the wedge by those who would privatize universities, and indeed, privatize knowledge generally.

But: these processes and paradigms only accomplish the goal of privatization if they are effective. Were they not effective, they would not be a danger to universities at all. Nobody is trying to privatize universities by means of beer sales or fox hunting competitions, because there is no great demand from the public for university beer sales or fox hunting competitions. The people who are advocating privatization are hitting the universities where it hurts: and they are appealing to society's larger objectives in an effort to transform the university system.

They are aided and abetted by those who resist many of these changes, for while many of these changes would result in an improved educational system for all, the reluctance of public universities to adopt them is by itself the single greatest cause of the privatization of universities. University professors, by taking the narrow, self-serving view, hasten their own demise.

The Means of Production

Let's look in some detail at this:

Eskow continues,

Here are some detectable pieces of the pattern. (Not all who are impelled to destroy the university subscribe to all of these, and there are those who subscribe to some of them who do not wish the university harm.)

1. The Three M's--"Massification; "Marketization;"Managerialization" These may be self-evident; I'd like to write more about these later

When an academic writes that something is "self-evident," it almost certainly is not. But I digress.

A. Massification

Massification, in my understanding, is the employment of the instruments of mass production for the development and distribution of knowledge and learning.

People entering a contemporary research lab would be astonished at the degree of massification already in progress. Modern medical labs, for example, resemble production centres much more than they do Thomas Edison's garage. Teams of scientists, following strict protocols, work in assembly to synthesize, test and produce thousands of compounds. The sequencing of the human genome was possible only through mass techniques. Such researchers also use the means of the mass to disseminate their knowledge: journals are mass produced and shipped to every corner of the globe where identical scientists in identical labs reproduce their discoveries. Scientific progress is no possible without massification.

Only in the field of teaching does academia seem to have successfully resisted massification. Only in the field of teaching is the product the result of the individual craftsman, toiling alone, each bit of lecture a custom fit for the small group of students assembled before him. It is a source of continual frustration to society as a whole - why can't we devise a means of reaching everyone, and not only those favoured few with the time and money to spend attending university lectures? And when we look at the challenge of providing a university-level education to a global population of 7 billion and more, it becomes obvious that teaching must evolve. Were cars hand-made, only a fortunate and wealthy few would have them. The same is true for education.

A profession that insists that all its products must be hand-crafted dooms itself to oblivion. As long as university professors assert that the only form of teaching must be the in-person lecture they are hastening the development of non-university alternatives that prove otherwise.

B. Marketization

Marketization is, in my understanding, the treatment of education and learning as a commodity, to be displayed and selected for consumption by a paying public. Marketization (and not online learning per se) is the major objection David Noble offers in his critiques of distance and online learning.

Defenders of the university may then be surprised to hear me defend marketization. I have even written (half-written) a paper called "The Learning Marketplace." Why would I do so, if marketization is so contrary to the university culture?

The fact that it is contrary to the university culture is why the paper had to be written, but I have no intention, subconscious or otherwise, of thereby dismantling the university system. Quite the contrary, in my view, marketization may be the salvation of much of the university as we know it today.

Private enterprise theorists, as Eskow comments elsewhere, often argue that the market is the most efficient way to distribute a resource. Universities have steadfastly resisted that doctrine, maintaining instead an monopoly and control over the distribution of knowledge, reserving it either for their peers or for the select few who attend university classes. But clearly there is some evidence, is there not, that markets do provide an effective means of distribution? Otherwise we would not have grocery stores, we would have government food outlets. Otherwise we would not have restaurants, we would have government eating stations.

Markets work on the principle that the exercise of choice is more efficient than the exercise of control. The reason for this should be obvious: people are much more willing to decide for themselves what they want than to have it decided for them. Moreover, when somebody must decide for them, there is an increased likelihood that they will make incorrect decisions. As John Stuart Mill famously observed, the best indication in a society that something is valued is that people value it. The best indication that something is good for people is that people desire it as a good.

Where market theorists err is in their slavish adherence to the principles of the marketplace in all times and in all contexts. But marketplaces are known to fail, as anybody buying lumber in Florida in the wake of Hurricane Andrew can attest. Markets work only if there is a sufficient supply of a commodity. Choice is only efficient where choice may be effectively practiced. Where choices are forced, where commodities are in short supply, the marketplace collapses in on itself, spiraling out of control, rewarding the rich and powerful and leaving the mass without.

When something is in short supply, a call for the marketplace to distribute that good can (and should) be seen as folly: for the advantage rests entirely with the distributors, and none with the consumers. Thus it may seem that having the market distribute education may be called a folly, because education is, as anyone can see, in short supply. People today spend the equivalent of a price of a small house for a university education. I saw recently five day courses offered by Queens at a price that would buy a small car. Putting education into the marketplace in such conditions would be folly: it would be licensing the owners of knowledge to print money, and condemning the vast majority of humanity to doing without.

But there is no reason why learning must be a scarce commodity. Indeed, it is arguable that it is a scarce commodity only because universities and university professors have created a false scarcity. It is as though the news media of the world decided that the only way people could really understand the Balkan conflict would be to hear about it in person from a professional journalist. The result of such folly would be evident: people would pay thousands of dollars to listen to average journalists (not everyone can afford a Cronkite) while the vast majority would have no access to this information at all.

There is no reason why education must be scarce, and every reason why it can be produced in mass quantities for mass consumption. And in such an environment, there is no reason why learning cannot be distributed via a marketplace, and every reason why it should. For the best indication that something needs to be learned, as Mill would say, is that people want to learn it.

C. Managerialization

Managerialization is, to my understanding, the process whereby an academic relinquishes some control over the production and distribution of knowledge to a team and where that team is run, not by the academic, but by a manager. The manager, of course, knowing nothing about the subject in question, can be relied on to make poor decisions.

As a sometime software designer, I am certainly sympathetic to this line of reasoning. Indeed, an entire culture - the Dilbert Culture - has developed in the software community to make fun of the pointy-haired bosses who think they have some understanding of software design. I have no doubt that the same is true in other areas of endeavour, and were I promoted to coordinate the design of, say, a learning project in the field of microbiology, my academic interference would be as welcome as a focus-group expert at a hacking convention.

The problem, of course, is not the practice of employing teams to develop learning material: the problem is pointy-haired bosses. In the software industry, almost nothing is created outside a team. Even some of the most heralded individual achievements - unix, say, or Linux - have over time become the project of dozens, even hundreds, of dedicated individuals, each person working on their own area of expertise, suffering the indignities of more or less coordination by a manager. Indeed, looking at the wider world, only professors, it seems, have the wherewithall to resist working as part of a team, so much so that the term 'Lone Wolf' has been coined to characterize much of academic endeavour.

And, of course, no professor (or very few, at any rate, since I obviously count myself as one of the exceptions) has the expertise to professionally provide all aspects of educational delivery. It is no wonder professors say that the best and only means of teaching is in-class and in-person: no professor has the skills or the time to do anything else! But by their own dogmatic adherence to individualistic 'lone wolf' production methods, they make their own prediction a self-fulfilling prophecy.

A prophecy, moreover, which is demonstrably false. Teams of people working in unison in other fields have managed educational attainment far beyond that of any individual professor. Hundreds of millions of people could reliably create a Big Mac (two all-beef patties, special sauce, lettuce, cheese and a pickle on a sesame seed bun). Millions more could state with conviction why a 2-5-5 defense is ineffective in a football game, analyse the comparative merits of Randy Johnson and Nolan Ryan, comment knowledgeably on the weather, sing a Beatles song and play a round of golf (correctly, within the rules, though perhaps not well).

And: so long as professors refuse to work as part of top-flight educational teams, more or less competently managed, their achievements will be eclipsed, over time, by teams of skilled professionals producing top-flight educational materials. And when professors, teaching alone in a classroom, are widely recognized as an inferior (not to mention expensive) form of education, the call for privatized education will take full flight.

Massification, Marketization, Managerialization - to the degree professors resist these, rather than embrace them, they are hastening their own demise. It seems to me that the best minds in society could find ways to make the 3Ms work for all of society - but instead they sit in their little offices, careless of society, wondering how their pleas of 'quality' can be possibly relevant to the many millions of people who never shadow their hallowed walls.

Language, Truth and Logic

Eskow continues,

2. Changing the Rhetoric of Education

Students as "customers"; the college as a trading company, importing and exporting; "standards" that can be "measured"; "brokers"; and, of course, "productivity," "efficiency", "accountability." And: "quality control."

Profound clue: John Chambers of Cisco popularized the notion now a cliché in the forprofit community that "education is the next 'killer app'." One doesn't have to be Freud or Jung to see the implications of both "killer" and "app." Or to sense the possibility that one of the things that has to be killed by the app is the university.

As any linguist knows, the words we use are used to reflect reality, either as it is or as we would like it to be. Thus, words such as 'phlogiston' fell into disuse as our concept of reality came to encompass oxygen, and our use of the word 'girl' declined, with much encouragement, as a reflection of our desire to minimize the diminution of women. A vocabulary is like a mirror into a person's world view: words express meaning, meaning expresses reality, either shared or solopistic, either faithful or fancied.

The words Eskow lists fall mostly into the category of representing the world as we wish it to be, a fact he seizes upon to assert that their use reflects a hidden agenda. For any person without effort can find instances which prove that the university system is not, as he suggests, customer (or learner) centered, efficient, effective, or productive. The typical university lecture does not adhere to any standards (at least none that I can detect), learning is measured only in the crudest of fashions, and professors - the bearers of ultimate job security - are certainly not accountable.

Your words, not mine.

Eskow quotes John Chambers as describing learning as the next 'killer app,' implying that university education is what will be killed by some new technology. Perhaps so. It is worth noting that the term 'killer app' was devised, not merely because it was fatal to some preceding category of products, but because it was widely used, wildly popular, and became a paradigm for the applications that followed.

Mosaic - later Netscape - became a killer app, popularizing the World Wide Web and the internet in general because it bucked conventional (and I might add, professorial) wisdom, by allowing people to view graphics. People familiar with the history of the internet are familiar with its academic origin: and such people sometimes cynically say that only university professors thought that pictures and graphics would not be needed for online communication.

Email flourished as a killer app because it replaced an outmoded and inefficient organization: the post office. Today the flow of messages by email far exceeds the capacity of the post office. The writing of messages on paper, the placing of paper in envelopes, the procurement of tariff stickers (called stamps), the trek to the post office box, the wait while the physical package is collected, sorted and distributed (by foot, no less) - all this was a technology waiting to be superseded by a

more efficient, productive (and dare I say, standards-based) replacement.

I have heard the lament more often than I care that the web has produced a wealth of poor graphical design and that email has produced an endless supply of drivel: and perhaps it has, from people who never engaged in graphic design before the advent of the web, and from people who never set pen to paper when mail was a cumbersome task. And the same critics overlook the awkward design of most publications in print (not everything is National Geographic or the National Post) and the steady deluge of junk mail that flows, even today, into our mailboxes. Much less the time and cost of producing pens, paper, envelopes, stamps and a worldwide pedestrian delivery system.

The fact is, killer apps become killer apps because they're better, and so when John Chambers suggests that online learning will become the next killer app, it is because he thinks it will be better - much better - than the contemporary pedestrian product.

And how might it be better? The new vocabulary - used not only by potential privateers but also by people genuinely interested in education - tells the story.

A. Choice

Students as 'customers' - or in the more common parlance of educators, 'student-centered learning' or even 'learner-centered learning' - a reflection of the desire to create a system where universities exist to serve students' needs, and not professors' needs. This does not (necessarily) reflect a 'customer-is-always-right' attitude - as any patron of McDonalds will tell you, the customer is often perceived as wrong (you get a pickle whether you like it or not). But it does reflect an understanding and even an ethos that the purpose of the institution is to provide students - the customer - with what they want (not to mention, paid for).

A lot flows from that assumption, but I will key in on one thing which encapsules the difficulty contemporary universities have with the student-centered approach: choice.

Aside from some very broad choices (will I study engineering or philosophy?) students have very few choices in a university. Having selected a program, they are routed to a faculty, given a small selection of options and a bevy of required courses, and are assigned professors (if they are lucky, they will learn about and manage to avoid the particularly bad professors). Inside the classroom, they have very little choice about the course content, nature and number of assignments, criteria for passing, time and place of course offerings, labs, workshops or seminars. They have no choice at all regarding their classmates, limited choice in assigned texts and readings, and are unified in their quest for a single (obligatory) goal, the university degree.

No doubt all of these decisions are made for the benefit of students. Sometimes - often, actually - these decisions will in fact be correct decisions. It is a nice healthy line-up of educational nutrition. But imagine a grocery store where, once you have selected your food type (Italian, Chinese, Indian), you are routed through a certain set of aisles. You are given one or two of each product item to choose from, and you have a set of required products you must purchase. You are required to show that you are able to prepare the food correctly before you leave, but you must prepare it in a certain way (depending on the whims of the cashier). You will buy - and only buy - a full year's worth of food. No doubt many of these decisions regarding food and nutrition are correct decisions, but the experience is entirely unsatisfying, and to a diabetic, fatal.

It's a simple thing, choice. Yet if John Chambers can develop an application that provides educational choice, the killing fields will be littered with ivy-covered rubble.

B. Standards

Standards - of course university professors are notorious for resisting standards, at least so far as the practice of their profession is concerned. This has the result of creating frantic student consultations in the halls and campus pubs in a determined effort to avoid the notoriously bad professors (my own experience cannot be that unique, can it?). It is difficult even within a single institution to determine what constitutes a first year logic class, let alone to determine this across a nation (much less world-wide).

In no other field is such a crass disregard for the nature and quality of the component parts of a product or service so brazenly displayed. Those very academics who rail against standards would be appalled were they to learn that the airplane they are flying was assembled, ad hoc (no doubt by a team of skilled craftsmen) without regard to wiring, fuel or aviation standards. They would not dare drive were they to learn that the reliability of their tires was not proven. They would not eat food that may or may not contain arsenic (much less peanuts), would not drink water which could not meet certain criteria of safety. They expect that the wiring in their home will not only be up to standard, but also that it will be inspected by a third party to make sure. Yet in this, one of the most important investments of time and money a person can make, they expect to fly without standards.

I personally see no reason why there cannot be a 'standard' logic 101 in use world wide. The principles are fairly well understood and have been accepted without a significant change for the last two thousand years. A common base of examples exists and makes the rounds in any case. Tried and true techniques for teaching reasoning - from Venn diagrams to truth tables - exist. Yet there is no such thing, and no concept of what would constitute quality teaching of logic, and successful learning of logic. Except, I should add, for the innovation of a private standards-based test in logic, which is used only grudgingly (if at all) by academics (but most enthusiastically by people who teach logic online - what a surprise).

C. Efficiency

Efficiency - it makes no sense to have a highly skilled teacher spend half his or her time producing mediocre research so that he or she can get tenure or promotions. It makes no sense having a highly skilled researcher teach a class in order for him or her to keep his or her job. It makes no sense for either teacher or researcher to sit in front of a class while a test is being conducted, languish in the back of the room while a video is being shown, spends hours debating parking policies at a faculty staff meeting, and more. And when you have a hundred million graduate students to teach, then it makes no sense having eight students in a graduate class, no matter how good the exercise, because it means that most of those students will receive no graduate education at all. I'm surprised they haven't taken to the streets. I have only picked up on a few examples here, but it seems clear and obvious: if Cisco could produce an online learning system that was learner-centered, standards based, efficient, productive, and accountable, then people would abandon universities in droves, and more to the point, governments would be very hard pressed to justify spending a lot of money on the public system when the private system is doing the same job for more people and for less money. And even more to the point: we are already beginning to see signs of this today. Recently, DeVries was given accreditation in Alberta. This means that this private institution is now competing on a level playing field with the publicly funded colleges in

our province. Should they prove more popular and more effective, our government will not be able to justify spending money on demonstrably inferior and more expensive alternatives. In Pennsylvania recently, a charter school offered classes online - thereby drawing the ire of proponents of the traditional public system but the praise of parents who found this particular alternative a giant leap forward in ease of use and efficiency. To the degree that universities and university professors drag their feet in becoming student-centered, efficient, standards-based, accountable, and the like, that is the degree they are cutting the slender branch on which they all rest.

Quality and Control

Eskow continues,

3. Changing the Institutional Structures of Quality and "Control"

Not "peer review" in the tradition of the professions, but "quality control" in the tradition of the factory system. Note John's models in his message" ISO 9000, Dunn and Bradstreet. Business organizations, industrial organizations as models for the university to emulate.

Eskow's loaded terminology displays his distaste for factories, accountants and perhaps industry as a whole. As I suggested above, I sincerely doubt that he would fly in an airplane evaluated solely by peer review, but that points not so much to the silliness of his argument as it does to a misunderstanding of evaluation and review (and yet this guy is marking student paper... one wonders...)

Let me talk briefly about ISO and the 'quality' movement in general. What we have here is actually several things combined and sold as a package (as such it is a deeply flawed package, but it contains enough that is good to be marketable):

- First, it embodies the idea that quality can be measured, and
- Second, it embodies a business ethos which asserts that quality can always be improved, and
- Third, it establishes a team-based structure of quality circles in order to impel and enforce these quality improvements

When I think about 'quality', my mind always to a picture printed about a decade ago in the *Globe and Mail's Report on Business* magazine (a nice, glossy, short-lived tribute to the corporate way) of a group of young and earnest looking Japanese workers, seated around a table, called the 'Paddington Bears,' whose sole objective in life (so the caption went) was to reduce the number of scratches in TV monitors from 8 per million to 1.

Now: reducing the number of scratches in TV monitors is good. We would complain if we bought a scratched TV, and we would complain if the cost of TVs were doubled because every second monitor must be discarded. But: spending all day reducing the number from 8 to 1 per million is foolish; and making it the basis of society is ridiculous.

What we want to do here is separate the concept of quality from the corporate ethos in which it has been packaged and marketed as 'total quality'. We want to keep the good: airplanes that fly

reliably, food that is safe, water that is potable, education that is effective. And we want to discard the bad: individual subsumation to the wants and needs of the corporate entity, to the exclusion of all else.

Eskow, in deliberately conflating those three components of the quality movement, does his readers - and education in general - a disservice.

Focusing on quality only, we need to distinguish two types of quality. I have in previous emails referred to these as 'semantic' and 'syntactic' quality. One might think of them as 'qualitative' and 'quantitative' quality respectively. But I prefer 'semantic' and 'syntactic' to get away from the idea that the former consist only in touchy-feely emotions and that the latter consists only in cold-hearted mathematical calculations.

Now in the evaluation of student work, professors employ both forms of assessment on a regular basis. In the syntactic mode, they assess whether the student has his dates right, her facts straight, has correctly parsed a sentence, correctly applied a proof, use appropriate symbols in an engineering diagram, written a program that compiles, quoted Mill correctly, or successfully identified Shakespeare as English. In the semantic mode, they assess whether a historical description captures the mood of the times, whether a recitation of facts is relevant, whether a sentence flows, whether a proof is elegant, whether a diagram is neat and illustrative, whether a program is easy to use, whether Mill makes sense and whether Shakespeare's English is understood in context.

Obviously, no assessment of student work is complete without both the semantic and the syntactic mode of evaluation (though teachers are often criticized for ignoring grammar and spelling, even accuracy, in student essays, searching for that soft and fuzzy 'meaning' underlying the garbled scribble they see before them). So also it is with university instruction. Ignoring the syntactic misses the question of whether they are learning at all; ignoring the semantic ignores the question of how well they are learning. Ignoring the syntactic misses the question of whether a journal article follows correct procedure; ignoring the semantic ignores the question of whether it says anything worth reading. Two forms of assessment: and necessarily, two forms of evaluation.

Now the kicker: academics' evaluation of themselves, insofar as it occurs at all, is almost entirely semantic. Or to put the same point another way: there is almost no standards-based measurement of an academic's performance (except, perhaps, for adherence to the all-powerful (and mis-applied) bell curve).

Eskow identifies the 'peer review' as the traditional mode of academic evaluation. No doubt it is traditional, and widely practiced. But it is only half of a reasonable evaluation, and not even a very good half at that.

In my country, and no doubt in many others, we have a polite fiction called 'trial by your peers.' The idea is that in a jury trial, guilt or innocence will be determined by a panel of citizens similar to yourself. As I say, it's a polite fiction. I recently discovered that in Alberta (perhaps elsewhere), potential juries are selected from the set of people who have driver's licenses. This explains why I have never been selected for jury duty: I don't drive. But it also de-selects a certain, lower, stratum of society (one, oddly, corresponding with the set of 'peers' of many a convict, but I digress). Similar selection practices in other countries demonstrate a similar bias: selecting juries from the list of registered voters, for example, de-selects those people who, for one reason or another, are not registered to vote. Again, the weighting here is toward the upper stratum of

society.

But there's more. When a particular individual is brought before the court, both the prosecution and the defense have the right to veto a certain number of jurors. Any number of criteria come into play: people are disqualified because of their race, gender, occupation, residence, and more. Often, they are disqualified because of their opinions. Because I am an opponent of the death penalty, for example, I would never be selected as a juror in a capital case in the United States (so I understand, anyways). Naturally, this predisposes the jury toward a panel that will opt for the death penalty in such cases.

I have long wondered why gang members, homeless people, and other social outcasts never seem to be selected for juries. But of course, it's because the concept of 'trial by your peers' is a fiction. It really means, 'trial by your betters'. Or at the very least, 'trial by people who think in the right sort of way.'

In popular opinion at least - and I am of the same view - the reliability of jury trials is questionable. Since the not so recent OJ trial, or the less vividly remember Klaus von Bulow trial, people have come to see jury trials not so much of an exercise in justice as in manipulation. Social activists will reel off a list of people wrongly convicted by juries on the scantiest of evidence. Jury trials, at least some of the time, are much less an exercise in justice than of prejudice.

Now imagine the same system, but without any standards at all. Without rule of law, to guide guilty and innocent verdicts and appropriate penalties. Without rules of evidence to distinguish fact from fiction from hearsay. With no limits whatsoever on the biases, prejudices or qualifications of jurors. In essence, mob rule, with none of the standards that today (sort of) protect the innocent from wrongful incarceration, the guilty from dangerous liberty.

Such - in the academic world - is the essence of Steve Eskow's position. Is it any wonder it draws a society-wide roll of the eyes?

'Peer review' in academia is no such thing. Otherwise, we would see graduate students and even interested laypeople on academic review committees. No, journal review boards especially are populated with the academic elite, those whose publications and scholarly presentations have established their authority in the field. Nor is their selection random: constructivist journals do not select rabid anti-constructivists to review articles, Marxist journals do not recruit people from the Fraser Institute to edit their publications.

The actual review is secretive and closed-door. Nobody knows what process of reasoning, if any, occurs when professors are evaluating a colleague's work. The results, at least from the eyes of the layperson, are less than impressive: reams of dime-a-dozen articles in unread academic journals, arcane dissertation topics suitable especially for ridicule by the national newspaper, forgotten theses read by an audience of three (and here I think of my own unlamented "Models and Modality"). Authors do not even know who their reviewers are, much less whether they are peers in any meaningful sense of the word. And woe betide the author who is not willing to acknowledge duly established Authority. 'Trial by people who think in the right sort of way' indeed.

At least in the case of journal articles and publications, peer reviewers at least (we think) read the works they are reviewing. No such exposure to the actual product being reviewed occurs in the

case of teaching. It is folly - and rightfully recognized as such - to dub the review of a professor by peers who have never seen him teach some sort of assessment. Such a review has everything to do with how the itinerant behaves in the Faculty Club and nothing to do with the sort of education he or she has left behind in the mind of his or her students.

Peer review has its place, as does any sort of qualitative assessment, but to make it the sole - even the primary - determinant of academic merit is beyond foolishness. It creates - quite rightly - in the minds of the public the image of a self-serving cadre of Old Boys who all think they are wonderful and who collectively exhibit wisdom so great that the word 'genius' is an insult and a slur. Closed-door self-evaluation is as reliable in academia as it is in the airline industry or the food processing industry, which is to say, not effective at all.

Academia would do well to open its system of assessment and review to (a) quantifiable standards, and (b) an open review process. Something like a system of standards - call them learning objectives, performance outcomes, whatever you will - should apply to graduates of a given class. Society should be able to know, without having to take Jo Blogg's word, that an A in logic 101 means that the student can recognize some basic logical fallacies and can string together a simple argument. That's not so hard: and there's even a standardized test for critical thinking.

And there is no reason why academic performance cannot be the subject of open and public review. There is no reason to restrict readers to a panel of three mysterious experts: works up for review should be publicly viewable and reviewed by anybody who cares to read them. Journals may even rely on those very reviewers, but the publication of a poor article by even a good journal will be widely recognized as such. And there is no reason why students cannot evaluate professors, and if the results cannot be posted on a website, then students should at least have the option of expressing their views by taking the same course from another professor or even another institution.

None of this infringes on the professor's ability to do as he or she sees fit: however, when a review process exposes poor and shoddy work, as it inevitably will, such perpetrators will invariably be held to account. Which is as it should be: in academia as much as in airplanes.

The Implications of Re-Form

Let's examine how Eskow concludes before concluding ourselves:

John and his colleagues are in earnest. They want to Privatize, Massify, Marketize, Managerialize education. They want to change its vocabulary, and the new vocabulary brings with it the practices of industry--not the practices of the "new economy" or the "postindustrial society," but the older notions embodied in TQM and ISO 9000. Seonc Wave, if you will, not Third Wave. Each of us, I think, has to decide if this reading has merit, and if this is the intent of the new rhetoric and the new directions: conscious or unconscious intent. And perhaps more importantly, each of us has to decide what our position is on this drive to reform education-- re-form it in the image of business and industry. I think the future of distance education depends on whether this movement succeeds or fails, and I've chosen my side. And my hope is that those like John who do not yet see the full implications of their program of "re-form" will come to see things differently. They can become powerful allies for securing and improving the

university, instead of dissecting and dissolving it.

As a learned academic, Steve Eskow should know better to frame the argument in such a false dilemma. He should know better than to use such loaded terminology, calculated as much to inflame as to argue. His are the tactics of a southern lawyer arguing toward a carefully preselected and predisposed jury: he wants to paint all advocate with the same brush, and he is not above quoting some carefully selected freudian mythology in order to drive his point home. Steve Eskow would have you believe that if I support John Hibbs on this point then I am the same as the Great Satan, the corporate sellout, the soulless butcher who would cut the throat of a fair institution in a minute if only given the chance.

But: those people who are persuaded by Eskow's crusade are hastening that very act of homicide, sure as the Sun rises in the east. By perpetuating the idea that any change in academia is a knife in its back, Eskow is freezing the university system into an unsustainable stasis, ensuring that even the slightest attempt from the corporate side of the house will be successful.

It is interesting - ironic, even - that Eskow paints two divides: the collegial university system, on the one hand, and the cold, calculating world of business and industry on the other. But there are not two solitudes here, there is only one; were Eskow to look about society around him, he would find that all manner of enterprises follow the dicta of client service, accountability, efficiency and reliance on standards. Not only industry, but sports, recreational travel, home repair, cooking, amateur astronomy... absolutely, utterly everything but education (and perhaps some handmade wooden crafts shops).

It turns out, in the wider world, that people do not want to spend their time and money (a) meeting someone else's needs, (b) paying for work that doesn't need to be done, (c) not knowing the results, (d) not knowing what is being produced, and (e) is more than they can afford anyways. If this is the picture of academia that Eskow is defending, then it is doomed, and if by falling it must fall into corporate hands, then Eskow's own logic has as its inevitable consequence the privatization of education.

And that would be a bad thing: but not simply because some academics don't like it (and not simply because it doesn't meet their arbitrary standards of quality (whatever that is (because, remember, they are opposed to standards))).

Intellectual Wealth and Society

At the beginning of this treatise I spoke of the privatization of knowledge. I would like to say here that if the university system (and the public education system in general) fails, then this will result in the privatization of knowledge. Now even that is in itself not a bad thing - I have already acknowledged that there ought to be latitude for ownership of knowledge, whether it be by virtue of copyright on an essay, ownership of a patent on an invention, or some similar claim to intellectual or emotional property.

But the market economy, as I also suggested, works only if there is an adequate supply of the commodity in question. Once a scarcity is achieved, the market breaks down: we move into a monopoly (or duopoly, etc) mode in which prices rise all out of proportion to the value of the commodity and in which a substantial portion of the population is forced to do without.

With the rise of the information economy we have seen not only a concerted attempt to privatize knowledge but concordantly an effort to create artificial shortages in knowledge. Where once books circulated freely, were shared and loaned, read by the thousands in libraries, sometimes photocopied, sometimes transcribed by hand, there is today a movement afoot to create the single-use book, an entity that may be viewed but never reproduced nor shared nor copied in any form. Where once academics freely circulated copies of their article abstracts, exchanged ideas at conferences and conventions, today we see sponsored research, per-user subscriptions to e-journals, non-disclosure agreements, and more.

Clearly this is damaging to the intellectual wealth of society as a whole, because not everybody can afford to pay \$24.95 for each knowledge-product per annum, much less amass a permant and useful library of e-readings. Where once we could at least alleviate some of the strife in developing nations by sending them books and magazines, today we are told that such action constitutes a violation of copyright - it is not even legal to load our used copy of Windows 3.1 on used computers to send to East Timor, as some Australians found out.

But it is damaging also because it limits the voices we can hear. Just as top 40 radio streams consumers into a megastar mentality, so also dissenting voices disappear when knowledge is controlled by corporations and dispensed in pre-approved (and costly) allotments. We are all too aware of the Russian programmer, recently arrested in the United States for writing forbidden software, or the professor in (as I recall) Princeton who was ordered not to publish a decryption algorithm. But it is much more pernicious and much deeper than that. It is the expulsion of a boy who wore a Pepsi shirt to 'Coke Day' at his school. The forced apology and expulsion of a student who dissed a corporate sponsor.

The World Championships in Athletics are being held here in Edmonton as I write. The championships are sponsored by (in part), and thereby essentially owned by (in part), Nike. As a columnist in the Edmonton Journal observed, Nike's influence is pervasive: and at a press conference in which a renowned anti-doping athlete was asked to comment on the reinstatement of a competitor, the Nike spokesman intervened to assert that athletes would not be answering questions about doping. Bad for the image, you see.

We tend to think that the corporate control of information is about big things, like freedom of speech and the right to protest: and it is. But it is manifest in a deluge of little things, and bit by bit, our knowledge and our freedom are slowly eroded. And we're back to being the Paddington bears, not merely because we cannot utter any opposition to this ethos, but because we cannot conceive of one.

The fall of public education in this country and in this world would be a disaster of the greatest magnitude, resulting in the descent of a corporate curtain of ignorance. Failing to move, failing to respond to the need for a greater, more vigorous system of public knowledge than ever, is to silently, stupidly, acquiesce.

I cannot believe that educators today are not knowledge guerillas, silently and stealthfully subverting through the covert education of as many people by whatever means possible. I cannot believe that academics today steadfastly defend their bastions of privilege, ignorant of the fact that they castles they so rigorously fortify will defend a totalitarian regime that will upset their tottering rule. Academics must, in order to survive at all, obtain the support of the people, but they will not do this if they withhold from people the one thing they value.

I know that there are many open-source open-content academics in the community working hard to stem the advance. It is a race against time, creating public domain knowledge management systems, public domain encyclopedias, courseware, almanacs, maps and illustrations, literacy guides, media readers, free textbooks, trying like townspeople in the face of the invading army to hide as much of the community chest before the hordes descend to lay claim to everything they see. Hide, hide the knowledge where they'll never think to look for it: among the people.

Academics who defend their privilege in an Eskowish manner are like those who, citing the long standing tradition of ownership and privilege, sit on their treasure, thereby safeguarding it for the arrival of the invaders.

I really think that universities best protect themselves by doing the one thing they can do better than corporations: producing and distributing knowledge. But they must do it in such a way that it remains better than the corporate alternative. This means mass education. This means a marketplace of educational opportunities. This means top-flight educational resources produced by teams of experts. This means a student focus. This means efficiency, accountability and productivity. This means open standards and open evaluations. This means, above all, reform.

Academics are at the crossroads. They could, collectively, use new technology and new techniques to produce a flowering of human intellect the like of which has never been imagined. Or they can hunker down, cling to their privilege, and usher in the twenty-first century equivalent of wage labour and cut-throat knowledge capitalism.

Remember, the chains you most fear are the chains you forge yourselves.

I wrote this item in response to a request for an article, and so it conforms more to length restrictions than to any particular thread of discussion. It is included here because it expands on the idea of what I called in my introduction 'epistemological quanta' – the idea that what was once a monolithic thing – education – is breaking apart. And I try to argue, with reference to Minsky, that once we enter such a world the logic of connectionism and emergent properties begins to take hold. What we are seeing, I write, is learning as it evolves from a centrally controlled distribution of information from an expert to a consumer to an interactive, dynamic, user controlled set of information exchanges.

The Fragmentation of Learning

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In his groundbreaking work Marvin Minsky proposed that human intelligence is derived from what he called the Society of Mind (Minsky, 1988). The idea behind Minsky's theory is that the human mind consists of millions of task-oriented agents characterized by two major features: autonomy and ignorance. Autonomous in the sense that agents make decisions by themselves without direction from a central authority. And ignorant in the sense that agents never see the whole picture: they make their decision based on a limited set of inputs from other agents. From the autonomous actions of these agents, working in concert, human intelligence arises as an emergent property of the whole; though no individual agent could be said to be intelligent, the actions of the agents working collectively could be said to manifest intelligent thought.

It is ironic that Minsky called the collection of autonomous agents a society because society as it existed when he wrote *The Society of Mind*, and even as it exists today, does not operate as described by Minsky's theory. Despite platitudes to the contrary, contemporary society is not a society of individual action. It is a society of mass action: of nations and political parties, of labour unions, trade associations and professional groups, of mass media, broadcasting, assembly lines, religions, fan clubs, and professional sports. It is a society where taking direction is the norm, rather than the exception, and where activities in unison with others far outweigh the actions taken as autonomous agents. True, not all direction is autocratic, nor is all action compulsory, but nonetheless, without the mass, society as we know it would not exist today.

As a result of information and communications technology, this model of society is breaking down. New models of organization, new modes of action, and even new understandings of self are being increasingly defined by the individual as autonomous agent. By this I do not mean 'individualism' in the sense understood by, say, Ayn Rand. Autonomy does not entail competition with and disregard for the interests others. Rather, individualism, understood in the present sense, reflects the idea that individual decisions - to cooperate or to compete, to help or to hinder - are made autonomously, and not guided by a more or less autocratic direction from a third party. Autonomous individuals can and often will work cooperatively with others, but always at their own discretion, based on their needs, as they perceive them.

In her book *The Future and its Enemies* Virginia Postrel calls the defenders of centralized authority technocrats. Crossing political boundaries, technocrats favor stability and order (Postrel, 1998, p. 12). They are goal-directed. (p. 13) "By design, technocrats pick winners, establish standards, and impose a single set of values on the future.... There must be a single blueprint for everyone." (p.p. 17-18) In contrast to the technocrats, Postrel describes dynamism as "fluidity,

variety, competition, adaptation, learning, improvement, evolution and spontaneously emerging order." (p. 28) Similarly, "Dynamist policies do not try to rig results. They do not impose one best way." (p. 45)

Contemporary learning is designed along the technocratic model. It is designed to be stable and unchanging. It is characterized by rules, regulations, standards and policies. It is goal directed, and the same goals (high school, a bachelor's, a PhD) are desired for everyone. It is directed by a central authority - a ministry of education, a board of governors, a professor, a teacher - that provides direction, dictates outcomes, and establishes standards of performance. It is designed for the masses: a graduating class, a student body. And it, along with the rest of society is changing.

Society is changing because it can. Information and communications technologies, and especially the internet, have made mass individual communication and action possible. Where before people had access to perhaps a few thousand books, magazines and journals, the World Wide Web consists of at least a billion pages from millions of individual web sites (Sherman, 2001). This multiplicity of voices has resulted in a multiplicity of publishers; voters in the 2000 U.S. presidential election, for example, had thousands of points of view to consider, totaling 87 million pages, all within the reach of their desktop. (Alexa, 2001) Add to this the billions of emails, instant messages, and chat sessions exchanged each day. People today receive more information, from more sources, than ever before.

It is not possible for any individual to read all the information that is available. As a result, people are applying filters to the information they read: they collect, in bookmark files, sites they visit regularly. They create customized and personalized news feeds through services such as NewsIsFree. (Lasica, 2000) Media critics decry the lack of authority and credibility of these new news sources. (Lasica, 1999) And other pundits are concerned that individual filtering will narrow a person's view of the world, going so far as to suggest that they ought to be forced to view a centralized news source. (Shapiro 1999, p. 205) The distribution of news and information is becoming fragmented, and though waves of mass recognition sweep through the internet on a regular basis (the Princess Diana funeral, for example, or the "All your base are belong to us" craze), such incidents of mass awareness are emergent, rather than designed, phenomena.

Exactly the same trends are sweeping through education, though many practitioners are not aware of it (or deny that education will be affected in the same way). The number of educational opportunities available to an individual is increasing exponentially: not only may a person attend any of hundreds universities or colleges online (Office of Learning Technologies, 2001), they may take any of thousands of courses from any number of private and public providers in specialized disciplines, such as CyberU's Small Business Training Center.

Critics and pundits of education policy are raising the same concerns as media pundits. Writers such as David Noble suggest that new technology is resulting in the "commodification" of education, with a corresponding drop in quality (Noble, 1998). It is worth noting in passing that as much concern is raised regarding online credentials as regarding online learning. Nobody doubts, for example, that the information contained in C|Net's SmartPlanet online learning service is accurate. And it is worth asking "If face-to-face communications amongst students and teachers in classrooms are desirable for quality teaching and learning...why are schools rapidly introducing the Internet into the classrooms and why is distance education via the Internet growing each year?" (Belam, et.al) Despite the critics, online learning proliferates. And the readership at self-directed learning sites such as WebReference - more than 50,000 viewers daily - suggests that it is proliferating a lot more than is widely acknowledged.

Noble is absolutely correct in his main thesis, though. Education is becoming commodified. Attention, as he says, to "the production and inventorying of an assortment of fragmented 'course materials': syllabi, lectures, lessons, exams." (Noble 1999) The process is, as he says, "transforming courses into courseware, the activity of instruction itself into commercially viable proprietary products that can be owned and bought and sold in the market." (Noble 1998) And while Noble may rail against this trend, the same forces are at work in education as in information and communication generally: there is an ever increasing abundance of educational materials available, which is resulting in a narrowing of the field of opportunity for education providers.

What is pushing this abundance of educational material is a steadily increasing demand. While Noble may argue that "Education is a process that necessarily entails an interpersonal (not merely interactive) relationship between people..." (Noble 1999) learners using the internet are disagreeing with their mouse clicks, determining for themselves that in at least some cases, the intermediation of the educator is not required. And while learners can - and do - request direction from experts in any of thousands of list servers on the Internet, many are learning everything from Tai Chi to Internet programming to flower arranging on their own.

Institutions are busily creating online learning opportunities, not because of some deep desire for control over faculty, as Noble suggests, but because they must: if universities and colleges don't develop online learning, private enterprises will tap into this enormous market (\$7.1 billion dollars - Thompson 2001) by themselves. The distance learning market will increase from 5 percent of all higher education students to 15 percent by 2002. (Oblinger, et.al. 2001) One example of this is the corporate e-learning industry. Private sector companies earned \$1.4 billion in revenues from the sector in 2000 and are projected to earn \$4 billion by 2004 (Chen 2001) at minimum (Pastore 2001, Urdan 2001).

A large part of the reason for this is that learner expectations are changing. Just as news readers are filtering and customizing their news and information, online learners are learning to filter and customize their learning. This new mindset is neatly captured in a recent report distributed by EduCause (Oblinger, et.al. 2001, citing Frand 2001). In the "information age mindset," computers don't even count as technology, the internet is better than TV, and reality is no longer "real." The learner of the information age finds that doing is more important than knowing, expects to make mistakes and learn by trial-and-error, multitasks, and stays connected. There is zero tolerance for delays. And the traditional line between consumer and creator is blurring.

The new 'consumer' of online learning 'commodities' wants learning in a way never conceived by traditional colleges and universities. First, and most important, the new consumer wants it now. No applications for admissions or September start dates. The new learner wants it where they are because, as multitaskers, they are probably too busy to drop everything and take the bus downtown. And the learning must be customized to meet a specific need. No mandatory curriculum, no prerequisites: if there's something they don't understand, that simply creates a new education need. It's no wonder online learning is looking at portable, wireless internet as its delivery mode of the future! (Stover 2000)

What we are seeing is learning as it evolves from a centrally controlled distribution of information from an expert to a consumer to an interactive, dynamic, user controlled set of information exchanges. And while most traditional efforts in online learning are directed toward putting 'classes' and 'courses' on the internet, as exemplified in Bates's standard model (Bates 2000), online learning of the future is looking a lot more like content management or knowledge management. (Morrissy, 1999) Even today, we are seeing a rise in interest for 'just-in-time'

learning (and a corresponding rash of criticisms). But while the name 'just-in-time' suggests 'quick-and-dirty,' it is really an example of user-directed and demanded learning.

We reach, as an end point, what may be characterized as a "fragmentation" of learning, an environment where there are as many learning providers as there are web sites today, an environment where each learner picks and chooses from the array of opportunities. In such an environment, there is no centralized control of learning, no core curriculum, no universal set of standards and practices. Each person withdraws from the common pool that learning which is necessary for his or her interests and abilities. This suggests as well a multiplicity of delivery modes, from the 'how to rewire' instructions delivered via PDA to the top of a telephone pole to Tai Chi videos available on demand to informal seminars, conferences, and yes even, from time to time, old fashioned classes.

It is reasonable to ask - and many people will ask - whether as a result of this we emerge with a Minsky-style collective intelligence, or at the very least, a social level of education at least as high as exists today. But while such a question is probably of significant importance to the future of society, it is an empirical question. We are well down the path toward the fragmentation of learning and the question of asserting centralized control over our collective educational aspirations is well past moot. The age of chaos is upon us.

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This paper introduces a new thread to the discussion conducted thus far, the idea that students themselves are autonomous entities, and that this has implications on our educational system. I was fortunate to have had the chance to argue these points back and forth over several days with David Merrill, who himself has written on the topic. Basically, my point is this: it's not 'learner centered' if you tell the learners what to do, and this extends not only to learning style but to the selection of what to learn. In a more general sense: the system must be non-hierarchical and non-authoritarian all the way down.

In Practice...

Written January 28, 2002. Unpublished.

The Panel

SAN DIEGO - I am at the National Learning Infrastructure Initiative conference to take part in a panel discussion titled Learner-Centered by Practice: Applying What We Know About Learning and Cognition in Designing for the Online Environment.

With me were the panel moderator [Helen Knibb](#), [David Merrill](#) from Utah State University, and Lynette Gillis, a consultant with Learning Designs Online. Like most quality panels, these members pushed some of my thinking into new directions. And I think as a result we need to restate clearly what we mean by learner centered learning.

So - what do we know about learning? Quite a lot, actually, and we've known it for a long time. Helen Knibb outlined some features:

Learning starts from what you already know

Learning provides usable knowledge

Learning involves learning to learn

Learning is community centered

Learning is addresses a "discipline base" of knowledge

All this is well and good, but as David Merrill argued, most teaching on campus, online or off, is "terrible." Of 60 online courses reviewed, he argued, only five had any educational value at all. At best, they do nothing more than provide information, but [information is not instruction](#). The net result is what he called "pooled ignorance."

When we more to the concept of learner centered learning, it gets even harder. "Designing open learning is ten times as hard" as designing an online class, he said. Designers must go well beyond traditional "tell and ask" or "simon says" modes of learning.

But that said, good teaching does not change over time. The principles we have understood about learning apply in an online environment. "Technology is just another way to deliver stuff," he said. But the rules don't change: good teaching:

facilitates learning

apply to any system

apply to any architecture

are design oriented

Merrill's [five principles](#) could form the basis of the Commonplace Book of Learning:

Good learning is problem centered

It activates previous experience and knowledge

It relies more on demonstration than on telling

Learners should be required to use their new knowledge of skill to solve problems

And it should integrate new knowledge or skills into everyday life

None of the panelists had any disagreement with either Knibb's or Merrill's descriptions of good instruction. But on examination of this concept, especially in a web-based environment, we find ourselves drawn further and further from the traditional model of learning.

Lynette Gillis puts this intuition into concrete form. She described two projects undertaken by her group, one in which call center operators are taught new cell phone features, and another in which staff in a hospital are taught computer systems.

In neither case is the resulting learning structured along the lines of a traditional thirty-nine hour seminar and test. The cell phone application is essentially a virtual cell phone with two modes: show and try. The hospital learning was a combination of computer lab, expert coaching, self-study and documentation.

In preparing for the hospital training, Gillis's group undertook a large scale study looking at preferred training methods based on where participants were in their training. The focus groups suggested that people's preferences might change as they became more familiar with the material, and the study confirmed this suggestion.

When first introduced to a new application, participants preferred a short session in a computer lab. But for follow-up training and support, the vast majority of people opted for experts in the work area to coach them - no more classes. As mastery improved, they began to opt for self-study courses and documentation.

The Issue

As I learn about and experience more and more online learning, I found myself drifting toward a less and less popular position.

Well - that's not completely accurate: the position is one I sketched in my 1998 [Future of Online](#)

[Learning](#). But while intellectually I felt that it was a good prediction, I am acquiring more of a conviction that it was a good prediction (I won't try to explain the difference; just trust me on this).

The prediction is this: as online learning takes hold, fewer and fewer people will opt for traditional courses and classes, opting instead for less formal learner driven forms of learning.

In my talk I progressed through four phases of increasing evidence for this conviction. Experience - my own experience as an online learner is compelling. I never take classes, and yet have learned most of what I know today - from CGI programming to instructional design to Roman history - in informal, non-structured learning. On reflection, I find myself going through four stages:

Theory - I read the background (including even books) or theoretical basis for the discipline

Example - I look at examples of what I am trying to study, deconstructing the work, finding out what part does what

Practice - I write software, articles (like this one), or create web pages

Community - I distribute part of what I create, soliciting feedback, engaging in dialogue, participating in the discipline community

Observations: At dinner yesterday David Merrill suggested that my theory amounts to me wanting everyone to learn the way I do. I think there are worse ways to do it, but not, that's not it.

Having basically lived on the internet since the early 90s, I have had ample opportunity to observe how people who are strongly connected to the internet learn.

these people are not the sort of people who are studied by university instructors evaluating the effectiveness of online learning. For the most part, the university professors never even see this group, much less evaluate them.

For a significant number of people, if they want to learn about something new, they do not sign up for a university course or program, they [turn to Google](#). They find out what information there is about the subject. The internet community expects this of each other (from this expectation comes the expression "RTFM" (Read the, um, manual) before any sort of 'instruction' occurs.

Their second source of information comes from the mailing lists, discussion boards, Usenet posts and other sources of exchange on the net. People new to a field are expected to "lurk" - that is, to listen to the discussion for a bit before jumping in with questions and comments.

Through these discussions learners are exposed to the practice of the discipline. How this works varies with the discipline - programmers and designers are exposed to actual code or designs, writers are exposed to writing and journalists to articles, historians are exposed to the back-and-forth interplay between theorists, and instructional designers to pedagogy.

If the learners need more detailed instruction - and many do - they can opt for it in a variety of ways. In almost every discipline, some sites are dedicated specifically to providing instruction.

One example I use a lot in this content is [WebReference](#), a site accessed more than 50,000 times daily by web programmers and designers. [Project Cool](#) is another. My own [Guide to the Logical fallacies](#) is yet another.

At last, the new learner is expected to put the learning into practice. A new web page design, some sample code, an email question or comment, an article - the essence of the web consists in 'putting it out there.' Seldom does an endeavour fail to elicit comment. And the exchange that occurs between new learner and seasoned professionals integrates the learner into the community.

Research: I could probably refer to Lynette Gillis's work and leave it there. But I am compelled to mention the [Open University study](#) that I mentioned last week.

According to the study, the number of young people studying at a distance is increasing rapidly. What's interesting isn't the number of people, it's the reasons they give. They find it cheaper, according to the release, they want to start working right away, and they find the university a bad place to study. "Some of our students have come to the OU having tried studying at other universities, where they have found the lifestyle, including the lack of a strong work ethic that some of them perceive, not for them."

What are we to conclude from this? Minimally, that when given the option, many young people choose not to study in a traditional university environment. That as people become more connected, they choose alternative forms of learning. And that their choices are based in the fact that, on balance, the university isn't really a very good place to learn things, certainly not if you are not prepared to stop everything else in your life for four or more years. And for continued professional development - a rapidly growing area of learning as people become used to living in an era of constant change - a university course or program is simply unreasonable.

Practice: OLDaily is my attempt to instantiate my thinking in practice. Although it is called a newsletter, is designed to be a learning environment. My learners are professional course designers and people interested in online learning. My resources are the materials to which I link every day. My role as an 'instructor' (the word just doesn't fit) consists in my selection of materials and commentary surrounding that selection.

But OLDaily, the newsletter, is just a front. It is the most visible part of what is supposed to be the learning environment as a whole. For as materials are added to OLDaily, they are stored in a knowledge base. the knowledge base is intended to be used as a tool by people working in the field.

My theory of learner centered learning, in short form, amounts to this: learning ought to be created by the learner.

Now let me emphasize that I do not mean 'created' in some sort of constructivist way. What I mean is more like this: where in traditional learning (and traditional online learning) the selection and sequencing of the learning materials is a task performed by the instructor, in learning centered learning the selection and sequencing of the learning materials is a task performed by the student.

The system behind OLDaily, then, is a means of enabling this to happen. When completed (there is still quite a bit of work to do) it should be possible to work the knowledge base in a relatively intuitive way to create a sequence of learning activities directly related to the learner's area of

interest.

In the first instance, only one sequence is possible: a chronological sequence. Type something into the search field (or make selections in the advanced search) and a list of resources will be displayed, most recent first (why search engines don't at least attempt to sort by date is beyond me).

The search terms are not matched to the content of the entries in the knowledge base; they are matched to the content of the commentaries. That's important - it allows me to weave threads of thought through the knowledge base by employing a consistent vocabulary. Now what's interesting (in my view) is that I, as the commentator, do not know what threads of thought are being woven into the data. This is something discoverable only by the student.

From today's newsletter, I wrote:

[The Parsimony of the Explicit](#) I think there's something important happening in this article but I'm not quite sure I can put a finger on it. Elearningpost summarized it as follows: "David Weinberger: Most Web designers try to control the users' experience. Some try to shape it. And a precious few try to become that experience." That's not bad, but it misses the fact that most of the article is a response against a view proposed by the W3C's Charles Munat to the effect that, "a web site is data, relationships among data, and transformations that may be applied to that data. These are all abstract. For us to interact with a web site, the data/relationships/transformations must become concrete. In an ideal world, the user would have complete control over how this process of um, reification, for want of a better word, occurs." Weinberger's response is, essentially, that if you separate the content from the manner in which the content is presented - that is, if you separate the medium from the message - something important is lost. Now here's the important part: I think that both Weinberger and Munat is correct. The reader must create the relationships and the presentation, and yet, these must also be created by the designer. How how? Solve this, and you've solved the fundamental problem of learner centered learning.

I think that something like OLDaily is that meeting point. The learning sequence that results is, in a certain way, a dialogue between the instructor and the learner, but one in which the learner doesn't know what the instructor has to say until he asks for it, and the instructor doesn't know what he said until it is asked for.

I've been working with code to take this a step further - the automatic book writer. Now perhaps one day I will write a book, but not soon. One of my major problems with writing a book is that I don't know where to begin and where to end. A book is a linear representation of a three dimensional topic, and thus is never better than a certain facet. And a book is almost always representative of a facet distinct from the learner's interests (which is why the whole concept of sequencing learning objects is odd).

If you would like to try it out, [here is my book generator](#) (if you create a book you like, feel free to publish it and give me the royalties - heh).

OLDaily will also include some further features intended to further express this concept. While today there exists only the [Refer] link after each item, I will be adding two more: a [Research] link, which will give the reader an opportunity to create a sequence of resources based on associations with the current resource, and a [Reflect] link, which will give the reader an opportunity to create a running commentary that will be shared with other members of the

reading community.

What I am after here is a concept of learning where what is created is an environment, and where learning occurs through working within the environment. It is learner centered not merely in the sense that it is, as David Merrill would say, "open-ended", it is learner centered in the sense that the learning is created by the learner.

Will it work?

It is already working.

Epilogue

I saw this coming but I did it anyways.

In our discussion group here in San Diego - a group consisting mostly of university educators and administrators - I advanced the idea that learners, and not instructors, ought to design their own learning.

Now let me be clear - what I mean by that is learner created learning in the sense I have been describing above. It is not learner centered learning in the sense where we put them into a library and tell them to read. Experts are available. Instruction is available. But the organizing of the learning is undertaken by the learner.

Now in our discussions of learner centered learning the question of learning styles came up - inevitably. Interestingly, to none of us was learner centered learning a matter of designing for different learning styles. Not because we think that people don't have different learning styles (though Merrill hummed and hawed on the point), but because designing for different learning styles doesn't capture the essence of learner centered learning. A good designer can design for different learning styles while at the same time being instructor or institution focused.

But Merrill did raise a division of learning styles advanced by one writer - I forget the name and can't find it on the net (when will people learn to publish their stuff on the net, where people can read it!). Essentially, the author proposed that learning styles can be defined according to the learner's attitude toward learning:

Transforming - they engage and transform the learning materials

Performing - they do what they need to get an A

Conforming - they do what they need to get by

Resisting - they do not want to be in this learning situation

There are different ways to approach this thesis. One way is to suggest that you need to design for each of these four groups. Another, volunteered by a member of the audience, is that the objective of instruction ought to be to convert every learner to the transforming mode of learning.

To me, however, the fact that there are people in a class who are not transformers - the fact that

there are people in the class who only want a grade, who only want to get by, who don't want to be there at all - is evidence that the learning in question is not learner centered. Or to put the same point another way: learning centered learning means that each and every learner wants to be learning whatever they are learning.

In an important sense, learner centered design is a misnomer. Once we start making decisions for the learner - even if they are in the learner's best interests - we have moved from the realm of learner centered learning to the realm of instructor centered learning.

As I said, I saw this coming. Not exactly Valdy's [chorus of boos](#), but a chorus of comments to the effect that learners are not able to structure their own learning.

I reject that proposition.

Look at it this way: according to David Merrill, the instructors can't teach. And according to Merrill and many others in the audience, the students can't learn on their own. The two sentences can't both be true, because it follows from them that no learning is happening at all, a proposition that is manifestly false.

Now in fact a little of both is happening.

It turns out that university professors, even if they have no schooling in the finer points of pedagogy, are able to convey some knowledge of their field to (at least) those people with a genuine desire to learn about it.

And it turns out that university students, even if faced with "terrible" teaching, are able to organize themselves sufficiently well to be able to learn (and as many commentators point out, a lot of this learning is explicitly informal - study groups, sessions in the pubs, practice in student clubs).

Indeed, it seems to me that most of the evidence and most of the argument against learner centered learning is based on bias in the questions and bias in the practice. Bias in the question, in the sense that self-learners never seem to be included in studies of the effectiveness of learning online. And bias in practice, in the sense that (in a university environment especially) only learning accomplished through formal instructor-centered learning is recognized as legitimate.

I think it would be a useful exercise to develop some tools and some processes to support learner centered learning. To design, for example, a learning management system that sits on the student's desktop and is operated by the student, not the instructor. To compare, in a neutral field, the intellectual achievements of self-managed versus institutionally managed learners. To see what learners can do, if we'd only let them try.

I have always admired the energy of Arun Tripathi and his constant dredging of relevant philosophical works has been of value to me. And his summary of a book by Hubert Dreyfus (who I remembered as a cybersceptic way back when I was studying connectionism at the University of Alberta) prompted this reply. It's a complex paper. Dreyfus is essentially arguing that there can be no virtual experience. My reply is a combination of McLuhan and Hume. As extensions of our perceptions, virtual realities are no less immediate than physical realities, I argue, because the perceiver is real. And such perceptions can (and do) form the basis of our experiences, and this is sufficient for the transfer of knowledge. I write, the key to success in teaching is in being able to connect abstract thought with concrete experience, to represent new knowledge and new information (and practices and skills) in a way that connects with the student's accumulated body of experience. I never published this paper because it quotes Tripathi exclusively, and not the original work of Dreyfus.

Education and Embodiment

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We hear over and over again the idea that our online experiences are impersonal, disembodied experiences, and that therefore a full education, which necessarily involves bodily experiences, is impossible online. It is impossible because we are in an important sense detached from the physical world, and therefore unable to distinguish between the significant and the trivial, because there is no causal connection between ourselves and cyberspace, no consequences to our actions.

This view of learning and living online not only misrepresents cyberspace, it also misrepresents how we experience and how we learn generally. For we are not disembodied entities when we interact online; we remain feeling and breathing beings. Our experience of cyberspace is not one of disembodied transportation; it is one of embodied sensation. We experience virtual phenomena through the same mechanisms that we experience physical phenomena, by integrating such phenomena into a personal ontology. And by interpreting both virtual and physical phenomena from similar points of view, we are able to experience virtual phenomena in the same way that we experience physical phenomena.

As a consequence, in a fundamental sense the causal impact of virtual phenomena is the same as the causal impact of physical phenomena: we cry real tears at the death of fictional characters. The objective of education – and the root of foundational aspects of education, such as cultural awareness and expert learning – is not based in rote imitations of the teacher or master. It is not based, and could not be based, in physical phenomena alone. It lies rather in our being able to relate new knowledge to our personal ontologies, to root significance and importance in the construction of our personal experience rather than the ministrations of a master. Thus, the experiences necessary for education are available from virtual, as well as physical, sources.

1. The Experience of Cyberspace

Let me begin with the bit of Hubert Dreyfus, as quoted by Arun Tripathi:

"When we enter cyberspace and leave behind our animal-shaped, emotional, intuitive, situated, vulnerable, embodied selves, and thereby gain a remarkable new freedom never before available to human beings, we might, at the same time, necessarily lose our ability to distinguish relevant

from irrelevant information, lack a sense of the seriousness of success and failure necessary for learning, lose our sense of being causally embedded in the world and, along with it, our sense of reality, and, finally, be tempted to avoid the risk of genuine commitment, and so lose our sense of what is significant or meaningful in our lives."

There is, as there is with most of Dreyfus's writing, a lot packed into a short paragraph. But importantly, what is here asserted is inconsistent with what one actually experiences on the Internet. Now one assumes that Dreyfus has worked on the internet, but one wonders whether he has really lived on the internet, lived with the internet, and come to see it as anything more than disembodied text. My own experience is that the Internet is a warm, rich, lush environment, so far removed from Dreyfus's barren characterization as to suggest that we write about two different realities.

At the core of Dreyfus's argument is the idea that we do not causally interact with the world when we interact with the world through the Internet. The Internet, therefore, in an important sense, keeps the consequences of our actions separate from ourselves, and conversely, keeps our selves causally insulated from whatever happens in the world. The idea here is that if we do not have a direct physical connection with whatever it is we interact, we cannot have a genuine experience of that interaction. Hence we are unable to distinguish the irrelevant from the relevant, the real from the unreal, the significant from the insignificant.

This is the sort of conclusion one would expect to hear from someone who is observing the interactions that occur online from afar, from one who sees and even uses the Internet but does not engage. It is the sort of reaction one would expect from a person who, while watching a person read a book would conclude that the experience of reading must be barren and artificial because there can be no direct connection between the author and the reader. Yet we know from our own experiences that the act of reading can transport us to rich and engaging worlds, and that the interaction between reader and author can be as intimate and as detailed as many experience in the world outside books.

It seems to me that Dreyfus overlooks entirely the possibility that the mind can engage, through intermediate sources, the reality that lies at the other end of the interface. Indeed, it should be remarked that this is a natural and normal function of the mind, and that this is something that we must do every instant of our lives. All experience is, to a degree, mediated, either through the waves of light and sound that interact with our senses, or even through the nerve impulses that carry the impact of a physical event in our toes to our brain. And what is normal and natural for the human mind is that it creates a story around these interactions: where there are gaps in our knowledge, it fills them; where there should be feelings, it supplies them. The tapestry that is our daily experience of the world is no less a product of our mind than it is of the world.

The entire scope of media would be impossible were this not the case. Observe the people at a movie theatre during a sad movie - or feel it for yourself - and watch as they are genuinely moved by the presentation of images and sound, images and sound that are, moreover, known to be fictional. Any person who cries at a movie would deny that there could be no causal impact from the movie to the self: there is indeed a causal impact, manifest by the tears or the laughter or the cheers. And yet there is no causal connection between the characters on the screen and the patron in the audience, no causal connection because there could not be: the characters themselves do not exist, being nothing more than roles played by actors; the actors, meanwhile, are sunning themselves at a resort in Tunisia, oblivious to any emotions their past performance may be at this moment evoking.

And just so with the Internet. It is a channel for information about the world, no more or no less than any other channel: like a book, like a movie, like our direct perception of the world around us. And when we receive information from the Internet, or when we interact with people on a discussion board or chat line, our senses engage in much the same manner. We reach out and we create the world with which we are interacting: that creation becomes what we understand as reality, and it is that reality that has a causal connection with our thoughts and emotions: a causal connection, because the reality and the reaction are in the same place, in our own minds.

We do not - as Dreyfus implies - ever leave our own bodies when we interact online. We do not "leave behind our animal-shaped, emotional, intuitive, situated, vulnerable, embodied selves." Quite the contrary; we remain all of these things: we remain firmly rooted in our chair, head and senses remain mere inches away from pancreas and liver, and the experience of our online engagement remains a physical one. What happens in cyberspace is not a transportation of the self, but an extension of the self: we do not 'go out' into cyberspace, but rather, we 'look out' or 'reach out' into cyberspace. Dreyfus's picture is like one who, on looking through a telescope, would imagine that he is actually on the moon: but of course that is absurd. We have merely extended our capacity to gather information from a remote location and transport it back to ourselves. Astral projection though cyberspace is an impossibility, and it makes no sense to draw conclusions about cyberspace based on the suggestion that astral projection though cyberspace is a representation of what really happens.

2. Meaning and Experience

Dreyfus argues that "if our body goes, so does relevance, skill, reality, and meaning." The theory is that our experiences of the world occur not merely in the mind, but are a function of an entire bodily awareness. Nowhere is this more evident than in the domain of skills, where in order to do something with expertise - such as to, say, throw a dart - we must train not merely our mind, but also our body: and indeed, even, the actions of the mind, if applied to the throwing of a dart, actually inhibit our capacity to make the throw. And so, similarly with what appear to be higher level cognitive functions: our ability to determine which information matters to us and which information does not. For our relation with information is, in the end, necessarily a physical relation, defining our physical interaction with the world, and a physical interaction with the world is necessary in order to understand what information would have an impact on that interaction, and what information would not.

But the question of whether a bodily interaction with information is necessary for learning is moot. This is, more precisely, the question of whether stimuli that have their origin in the world and which enter our system through the mediation of the bodily senses are necessary for learning. We can stipulate for the sake of argument that the creation of meaning, relevance, skill and reality are impossible without the bodily acquisition of information. To be more accurate, it is probably more precise to say that, without the body, our creation of meaning, relevance, skill and reality would be very different from what actually is the case. But let us agree that at least some bodily experience is necessary. We are left with two important questions:

1. Is bodily experience *sufficient* for the creation of meaning, relevance, skill and reality? In particular, is their creation the result of some sort of *deduction* from physical experience? Obviously not: for we know that our conception of reality extends beyond that which we directly experience. Even our development of a skill transcends experience, for otherwise we could never throw a dart better than we have before. I have shot three 180s in a single evening; there was a time when I could not have done this, and had no experience of having done so: and yet I

produced in myself the skill to do it, to go beyond my personal experience. It is clear that experience, while necessary, is not sufficient. Something else happens.

Philosophers have of course suggested numerous theories as to what it is that we do. Some suggest that we have innate linguistic structures that organize experience in certain meaning-bearing ways. Others suggest that we have some sort of innate knowledge, such as the knowledge of our own existence, around which all our experiences are centered. For my own part, I aver that we do not add linguistic structure or additional knowledge to experience, but that we manipulate information, through a process of selective filtering and recombination, in such a way as to achieve balance or equilibrium. What is important here is that our personal ontology - our view of the world and our place in it - is generated through both experience and our manipulation of that experience. It is as though, as I suggested above, we fill in the gaps of experience: as though we add what is needed to the sketch we are provided to create the causally complex set of objects and interactions we call the world. But our personal ontology is wholly contained within the mind: it is not 'out there' somewhere, and though we may feel and believe that what is in our head resembles (or represents, depending on your theory) what is out there, the centre, for us, of meaning, relevance, reality and even skill is in our mind, in our head, and not external to us.

2. If bodily experience necessary for **every** instance in which meaning, relevance, skill and reality are created? Or, put another way, in **some** cases, could we, on the receipt of information only, with no bodily intermediation, attach to that information meaning or relevance? Or learn a skill? Or even say whether what we have experienced is real or not? Now of course, in all cases, we are going to receive information through **some** bodily channel, direct perception being evidently beyond our capacities. But the question is more like this: can information, accessed through purely cognitive means - such as by, say, reading - be given meaning, be identified as relevant, be designated as real, or teach a skill?

All experience comes to us through the body, for it wouldn't be experience otherwise. But our experience of some things is direct: we are in the physical presence of the thing, and can see it, touch it, or if necessary, taste it. Our experience of other things is indirect: we are not in the physical presence of that thing, but learn about through some form of communication, through some writing, for example, or a video broadcast. What we see, touch or taste is not the physical object itself, but some representation or image of the object. Viewed in these terms, the question just posed is thus as follows: can we learn about something even though our experience of it is indirect? Can we assess what we have experienced, identify it was relevant, give it meaning or place it into context?

And of course, the obvious and intuitive answer is: of course it can. You are in the act of reading this sentence. As you read it, you are posing (and answering) questions to yourself, questions such as, "Is he right?" and "Why do I care?" If you have a background in philosophy then as you read the paragraphs above you may have been saying, "Oh he means Chomsky" or "This sounds like Descartes." As with the previous discussion, it is harder to imagine one learning a skill on the basis of information alone, but there is no denying that the provision of information can help someone learn a skill: otherwise, when we want a person to learn how to, say, operate a radial arm saw, we would simply provide them with a saw and a lot of wood and tell them to get some experience. But we don't: we preface this practice with some sound, sensible, **cognitive** advice, from little things (like, "wear goggles") to big things (like, "don't put your finger in front of the blade").

The fact that our personal ontology is internal to the mind is what allows us to relate and to learn

about things in an indirect manner, and indeed, teaching and learning would be impossible otherwise. Through experience and training we come to associate a visual perception of a cat and the words "a cat" in much the same way: while on one level knowing that a visual perception of a cat is not the same as someone uttering the words, we nonetheless draw the same inferences ("four legs, a tail and meows"), contemplate the same actions ("feed, pet, toy with a laser pointer") and feel the same emotion ("awwwwww"). When someone describes the cuteness of their cat over the chat room window, my experience is analogous to a direct experience of that cat, analogous because I understand that the word "cat", a picture of a cat, and the direct perception of a cat, signify the same *thing* in my internal ontology, and thus, that what pertains to the real cat also pertains to the described cat.

Yes, I understand that the words on the screen merely represent the cat, and yet I understand that words are distinct from - and therefore have different properties than - cats, and yes, the cat in Romania is not rubbing on my leg. But being told, "The cat is rubbing my leg," signifies the same thing to me as a cat actually rubbing my leg, because I am able to understand that the words signify the physical event. And indeed if I am sufficiently engaged, if I am focused on nothing other than the words and what they signify, I can feel the cat rubbing on my leg, feel the pleasant sensations this evokes, feel warmth and fondness for the cat, even though cognitively I am aware that the cat is half way around the world.

Of course, if you have never owned a cat, much less seen a cat, it would be much more difficult for you to reproduce that experience from indirect experience alone. You would need to stretch the analogy a bit further, imagining it, perhaps, to be similar to your dog rubbing against your leg. Or perhaps, had you no experience with pets at all, you would imagine it to be similar to other exhibitions of fondness you have experienced in your life. Your direct experiences form the raw material from which you construct your personal ontology, and are essential in the beginning, but as you acquire a richer set of experiences, direct experience becomes less necessary in order for you to perceive an indirect, or virtual, experience in the same way you would perceive a direct, or physical, experience.

It may be argued that it is not possible to actually have a sensation of an event if the event is not occurring, but this again seems intuitively and obviously false. For if it were true, we would never 'hear' voices or music in our head (and yet, I can 'listen' to a tune endlessly in my head, so much so that the real problem is that I can't get it out of my head). Some people, such as myself, when they read or write, actually 'hear' the voice they are reading or writing. Visual perception works in the same way: it is possible for some people to visualize an object so clearly that the perception appears real. My guess is that it takes practice to attain such levels of visualization, but my own personal experience is that it is possible. When I dream, I have a sensation of being in a situation and feeling interactions: this sensation appears real to me, and it actually takes some degree of reasoning to understand that it was just a dream. When a person is hypnotized (and if hypnotists are genuine) then people can have experiences based on the hypnotist's suggestion alone.

Our capacity to have experiences without being in the physical situation that produces the experience is manifest: this capacity is based on our ability to comprehend physically different phenomena as though they were the same phenomena, in turn caused by our capacity to represent any given phenomena to our internal ontology in a way of our choosing. In an important sense, whether the experience is direct or indirect, we first construct the experience from both our sensory input and by analogy with previous experiences. Both direct and indirect experience of the same entity are thus remarkable similar, and as a consequence, produce similar effects in the mind. This is the basis on which entire industries are founded: the publication of books, the

showing of movies, the playing of music, teaching and learning, simulations and role-plays, and numerous more artifices beyond mention, so many indeed that any suggestion that bodily experience is necessary in every case appears absurd and misguided.

3. The Web and the World

Whole ranges of cultural phenomena are completely inexplicable if Dreyfus is right. The shock and distress felt throughout the United States when Kennedy was shot. The triumph and exaltation we felt watching Neil Armstrong step on the moon. The joy and pride felt by Canadians when Henderson scored the winning goal in 1972. The disbelief felt by so many when Elvis died. The outburst of sorrow when Princess Diana was killed. The horror felt around the world during the World Trade center disaster. The anger people feel as they watch the continuing violence in the Middle East. None of these are events that happened *to us* - we experienced them only virtually - and yet they have a deep and continuing impact. In October of last year I was in Sydney and a large aircraft flew low over downtown to avoid a thunderstorm. I looked up and *felt* *fear* - a tangible emotion caused not by the low flying aircraft but by my virtual experience of the terrorist attacks half a world away.

Dreyfus (and others similar in thought) depict in their minds a scenario in which nobody ever enters the world. Arun Tripathi quotes William Bennett talking about, "A school where students never enter a classroom. Where their math and science lessons are done in cyberspace, from home. Where their teachers sit in front of a computer instead of a chalkboard, and communicate with them by phone or e-mail. And where parents act as academic coaches, guiding their children through it all." And Dreyfus writes, "E. M. Forster envisioned and deplored an age in which people would be able to sit in their rooms all their lives, keeping in touch with the world electronically. Now we have almost arrived at this stage of our culture. We can keep up on the latest events in the universe, shop, do research, communicate with our family, friends and colleagues, meet new people, play games, and control remote robots all without leaving our rooms. When we are engaged in such activities, our bodies seem irrelevant and our minds seem to be present wherever our interest takes us. As we have seen, some enthusiasts rejoice that, thanks to progress in achieving such telepresence, we are on the way to sloughing off our situated bodies and becoming ubiquitous and, ultimately, immortal."

And yet - as I write this item I am eating three bagels and a pear alongside my coffee. This is necessary because I felt hungry. I have been typing for about an hour now and I feel a little bit tired. I pause, and look out my window to the green forest. An air conditioner drones on the wall beside me, needlessly in today's cool April weather, and annoying as vibrations echo through the room. I'm in my office, here not because of the dictates of connectivity, or even of employment, but because I like to say "Hi" to Sophie in the morning, to exchange jibes with Rod out on the patio, to feel the wind in my hair as I cycle down the hill, to select my environment. Solitary? Disengaged? I am never alone! If I really wanted to get out of touch with the world I would put down my keyboard and take a walk through the trees.

Dreyfus and others depict a world in which cyber interaction replaces all physical interaction and yet it is a world that exists nowhere but in their own mind. No proponent of online learning (save, perhaps, Bennett, assuming (which I doubt) that he is a proponent) proposes that students be locked in their rooms to interact online only. Why that would be as absurd as forcing them to travel to a special "learning room" completely isolated from the rest of the world! But even more significantly - even at the *very* *time* I am online - such as now - I am intimately connected to my body and to the world. It is not as though my physical experiences cease simply because I am

typing and reading a computer screen. No, hardly. Nobody escapes their body, and it is disingenuous and dishonest to suggest otherwise. Every minute of every day, one is in contact with his or her body, and as a consequence, is aware on a minute by minute basis of its feelings, its needs and its foibles. Yes, perhaps there may one day be a way to transfer our minds completely into a computer: but until and unless that happens - or even comes close to happening - concerns such as Dreyfus alleges are moot.

Indeed, I would take this even a step further. Douglas Rushkoff, in *Cyberia*, pointed out that people who work on the internet find themselves traveling a lot more than they used to. This is certainly my own experience: in the last couple of years, even, I have traveled further and wider than I could have imagined in any former life. I have also met more people, attended more conferences, and touched tangibly more and more people. As I connect with people around the world there is a **pull** that draws me from my desk and into the world. **This** is the genuine experience of cyberspace: we are drawn **closer** to the people around us, not separated from them by a wired degree of separation.

The advent of wireless and mobile internet - a development no doubt feared by some - frees me even from this office, keeps me connected even when I am in the forest, allows me to visit friends in Australia without losing touch of my correspondents in Argentina, allows me to react, to **be** **in** the world in a way I could never be before, changing my one-dimensional and merely physical interaction to a rich multilayered set of interactions with others, adding to and enhancing, not replacing, my physical presence in the world. The suggestion that the internet would somehow replace physical experience can only be a suggestion made by a person with no degree of involvement with the online world: It is as though they are suggesting that seeing in colour somehow diminishes our ability to see in black and white. But they have never seen in colour and cannot know that only by seeing in colour are we able to appreciate the unique and valuable nature of the monochrome art form.

4. Culture and Telepresence

Arun Tripathi quotes Dreyfus, "Like embodied commonsense understanding, cultural style is too embodied to be captured in a theory, and passed on in courses. It is simply passed on silently from body to body, yet it is what makes us human beings and provides the background against which all other learning is possible. It is only by being an apprentice to ones parents and teachers that one gains what Aristotle calls practical wisdom -- the general ability to do the appropriate thing, at the appropriate time, in the appropriate way. To the extent that we were able to leave our bodies behind and live in cyberspace and chose to do so, nurturing children and passing on ones variation of ones cultural style to them."

Dreyfus's point here is that there is some knowledge that cannot be passed from person to person through teaching, that it can only be acquired through a process of direct interaction. He captures this point through invocation of what he calls "cultural style," an example that seems more appealing for its vagueness than its basis in fact.

No doubt Dreyfus is a cultured and cultivated man (I have never met him), popular at parties, the one with the nod and a smile at exactly the right moment, the one people want to be like, or to be seen with. My own experience differs. Culture is something I never really acquired: my experiences in high school and university form a *mélange* of one awkward social encounter after the other. I was a nerd and a geek in the classic sense of nerdiness and geekiness, more likely to be the one in the corner of the room weighing arguments with a pint or porter than the one

exercising witty repartees with the cultured elite. I am still that way to a some extent, and yet this is due to no lack of social engagements: I have had many examples to emulate (and have even tried from time to time, but it appears that culture, like a suit (in which I am also uncomfortable) is much more a personal matter than a socially shared set of conventions).

I am by no means alone, though perhaps you need to escape from the centre of the party to see this: in my storied history of bowling allies and biker bars, malls, neighborhoods and back allies, classrooms and clubrooms, Legion halls and living rooms I have seen more than my share of cultural inappropriateness. Indeed, if anything seems to be the rule, it seems that people do *not* learn culture except via explicit instruction: that the mannered are well schooled in their manners, that breeding - as they say - shows. I am all too aware that what passes for being "passed on silently from body to body" to Dreyfus is experienced by many as "passed on from bully to victim" in the schoolyard: that our cultural awareness, if indeed any such thing exists, is nothing more than a complex set of coping mechanisms designed to enable a smooth (or at the very least pain-free) passage through the rites of childhood and adolescence. Even in my thirties and forties I find myself being given explicit cultural lessons ("You don't announce how many games you've won," I was told, after summarizing the results of a particularly good set. "Since when?" I replied.)

Children are explicitly told to mind their manners, to sit up straight, to chew with their mouths closed, and more. Everybody knows the day they were instructed in the use of the salad fork (and how it differed from the dessert fork), for no amount of observation and emulation seemed to riddle this mystical morass. In my own life, the moments of cultural awareness came as the result of explicit - and pointedly non bodily - instruction: I learned how to communicate in a corporate environment by taking a video course called "On the Way Up" while I was with Texas Instruments in Austin; I learned how to speak well publicly by reading a book (I believe) by Keith Spicer called "Winging It," and I learned how to be the popular (and humble) man I am today by studying Dale Carnegie's "How to Win Friends and Influence People."

On looking back on my education, I think that I would have been much better prepared for the world around me had I experienced less of Dreyfus's body to body interactions and more explicit instruction. It would have been very helpful to me to be able to enter simulations or practice environments where I could 'try on' social personas for cultural fit, to find a style I found comfortable and which did not offend the neighbors. I do not know what it is about cultural knowledge that Dreyfus feels can be transmitted only through body to body knowledge, but I am quite sure that as we press for the details we will find that this knowledge is very rarely passed except via explicit instruction, whether it occurs in the schoolyard, the classroom, or in very many cases (to judge by the self-help section in the bookstore), via books and audio tape.

5. Embodiment and Education

Nobody believes that (as quoted by Arun Tripathi) "the development of the Internet will solve all the problems within education." Nobody. To put it in philosophers' language: the Internet is a necessary, but not sufficient, means for providing a quality education for all.

The quote continues, "If the development goes in the right direction, they maintain, first class education will be available for everyone - in so far as they master the information technology. Thus the problems posed by too many students and too few universities as well as the serious problem of access to the good but expensive universities will be solved."

Again, more misinformation. Educators and designers work toward educational systems where it is not necessary to "master the technology". And online learning isn't about providing everyone with "access to good but expensive universities" - it is not about that at all. To many people - myself included - it is about replacing the *need* for "good but expensive" universities, about making education that is cheap, easy to use, accessible and applicable, making it available to everyone regardless of their income. The idea of online learning isn't to solve the problems that beset an array of nineteenth century institutions but to come up with a twenty-first century replacement for that array.

It will take much more than techno-dollars. Much more. We have to rethink in some fundamental ways just how we go about teaching people, how we *can* go about teaching people now that we have some real tools (as opposed to cave-people chalk-and-slate media) for teaching.

Here is the Dreyfus take on distance learning, as described by Arun Tripathi: "the imitation of the example of the teacher is a crucially important element in education at all levels. In many areas, the student can only learn to be an expert by imitating the day by day responses to specific situations of someone who is already an expert, or ideally, a master, and only by working closely with students in a shared situation can teachers pass on their passion and skill to their students. As the shared situation included community practices as part of what is learned and sometimes it will not, but in any case the actual presence of the coach or master is essential. So, in general, in so far as we want to teach skill in particular domains and practical wisdom in life, which we certainly do, we finally run up against the limits of the World Wide Web. As far as we can see, learning by apprenticeship can work only in the shared situations of the production sites of the crafts, or in the nearness of the classroom and laboratory; never in cyberspace. Thus the use of the Internet represents an impoverishment, not an improvement, of education. It can facilitate a kind of mass education, but it will only teach the students the rules and facts that can make them competent."

I think that people *do* learn by imitating, but I'm not sure it's always appropriate, and I'm not nearly convinced that learning by imitation in a classroom environment is the way to go.

I believe that people learn by imitating. I can recall numerous instances when I have done it. Most of my recollections, though, are of hilariously bad imitations. The day when our Scout Troop was camping by the shores of the St. Lawrence river and we found a particularly good wood for burning (called "punk") that the assistant Scoutmaster called "den-o-mite". Well, he probably said "dynamite," but I heard what I heard. Of course, when I repeated the word a few hours later, it was deemed ridiculously inappropriate by my fellow scouts. Or when I heard my boss Bob Avila say of Carly Simon, "She has the perfect life - a hit song and married to James Taylor" - I learned the hard way that only James Taylor fans would find being married to him anywhere near perfect. That's the thing with learning by imitation: it's hit and miss. When you learn by imitation, you fail to make those subtle distinctions between the imitations that will be genuinely useful in later life and the imitations that demonstrate clearly that you have *not* mastered the intricacies of cultural awareness.

In the classroom environment though my teachers were without exception well intended, they did not always make the best models to imitate. Over time I learned as every schoolboy learns that teachers are exactly *not* the people to imitate, for they embody everything (well, almost everything) that a person does *not* want to be. A know-it-all. A ruthless despot and enforcer of order. Sometimes inclined to allow personal preference to outweigh justice and fairness. Completely culturally unaware (one teacher of mine had the affront to confiscate my collection of hockey cards - the most serious and deeply disturbing action anyone could undertake on the

playground, and action that would be, except for the imbalance of power evident in every classroom, a mortal sin).

In any case, if imitation is the source of learning, then teachers are (and always will be) vastly outnumbered. Even in special cases where the master takes the apprentice under his wing, there are numerous outside influences. In today's mass media environment, people are much more likely to imitate Bart Simpson than their math teacher (they see more of Bart Simpson, and in any case, he's popular). People hear the cultural wisdom of 'NSync dozens of times a day; no teacher could hope to match that. One's older brother is a much more pervasive influence than one's once-a-week geography teacher. And in the kingdom of the schoolyard and the locker room, as everyone knows, the teacher holds no sway whatsoever. What we find in contemporary education is that the influence (and imitation of) the teacher runs counter to many of the prevailing trends, so much so that there are concerted efforts to provide children with positive role models on the television screen, in cinema, in music and sport, and yes, even on the internet (through such sites as PBS's recent "It's My Life").

It is fortunate indeed that educators can depend on a much wider array of teaching tools than rote imitation. It is fortunate indeed that the primary role of the educator is to teach the student to move beyond mere imitation and into higher levels of cognitive awareness. One of the major arts the teacher practices is to enable the student to reason - and learn - at what might be called higher cognitive levels, to not depend on what embodiment for instruction but to be able to reason and integrate learning more abstractly. Yes, to a large degree, what we learn will be necessarily concrete, but from the first day of school the teacher - through the process of teaching language, art, mathematics and music - is teaching the child how to represent perceptual experiences in non-perceptual form, so that (for example) the student can learn about Spain without actually having to be taken to Spain.

The key to success in teaching is in being able to connect abstract thought with concrete experience, to represent new knowledge and new information (and practices and skills) in a way that connects with the student's accumulated body of experience. With a mathematical formula to evoke *this* reaction, with a turn of a phrase to evoke *that* sensation. Connecting language with experience is probably the most difficult form of learning possible, but it is also the most effective, for language is pliant in a way that experience could never be, and if I could, with words, *describe* the moons of Jupiter in such a way that you actually, physically, shiver, then this transcendence has been achieved and mere imitation is no longer necessary.

For what the teacher wants to do over the course of an education is to facilitate in the child what I have been calling a personal ontology, a world view full of causally connected experiences, populated with entities (necessarily constructs of the mind), where rules and principles apply, some by nature, some by society, where the consequences of actions and interactions in the mind resemble in important ways the consequences of actions and interactions in the world: no instructor can ever transplant his or her personal ontology into the mind of a child, for no child has the instructor's experiences and sensations, but through the generation of experiences and interactions, and through the provision of cognitive tools useful in creating a framework and interface layer, the instructor can foster the child's development of his or own personal ontology and the tools needed to use it as a means of understanding and interpreting all manners of information, real or virtual, in the future.

6. The Promise of Indirect Experience

So in one, trivial, sense Dreyfus is correct. Of course we need direct experiences in order to learn. Direct experiences are the raw material from which we construct our personal theory about what's in the world and what it does, our personal ontology. The entities we touch, see and taste form the prototypes against which we evaluate, understand and assess subsequent experience. Were we to have no direct experiences, we would have no basis, no foundation, on which to learn anything at all.

Fortunately for the teacher's art, none of us is without direct experiences even for an instant. We are at all times connected to our body, at all times amassing and assessing a constant flow of sensory input. Even when we are watching television or surfing the Internet, the body's productions continue endlessly. The data we collect from the video terminal forms only one part and arguably even a small part of the experience of the moment.

True, what we experience on the Internet is only an indirect experience, but the words and images displayed on that tiny screen can produce a powerful impact. They can take us to distant nations, to introduce us to people from different cultures, expose us to difficult ideas. The power of the Internet is directly derived from the fact that it is indirect: a galaxy of worlds and ideas beyond our experience, beyond what we could experience, is presented to us. And yet, because we have in our mind a cognitive basis for the assessment of indirect experience, a personal ontology against which we can weight this wealth of information, we can experience these worlds and ideas for ourselves.

Of course the world on the computer screen is a virtual world. But the experience of that world is real, and in the end, that's all that matters.

In a doctrine that has been popularized this year in the paper World of Ends, good network design involves making the network stupid and the applications smart. The idea is that the network should not establish anything more than a minimal constraint (and as I say elsewhere, only a syntactical constraint) over its contents. The reason for this is that the purpose of the network is to enable unfettered (and unaltered) communication from one node to the author, and each constraint acts against this. It is with this in mind that I reacted to the idea of smart luggage that never gets lost, and so I floated the idea that the smartness of the network could be obtained not only by making the ends intelligent, it could be obtained by making the objects intelligent.

Smart Learning Objects

Written May 4, 2002. Published in [Learning Place](#), May, 2002.

A recent article [1] about airline luggage prompted me to think about learning objects in a new way. The premise of the article was that that airlines would lose luggage less frequently if the luggage were equipped with more intelligence. In other words, 'what if we managed bags like we managed people?' After all, 'passengers are smart entities traversing a stupid network, whereas pieces of luggage are very stupid entities traversing a marginally smarter network.' Wouldn't it be better if 'a suitcase could check itself into airplanes, order transportation, track news about delays or cancellations, and make sure, in case of unforeseen changes, that it will be booked on the next flight or sent back home again?'

My first thought was that we could revolutionize education by treating students more like people and less like luggage. Students, for example, could pick their own learning 'destination' (though we may want to provide them with learning 'travel agents' to help them). They could choose their own time and mode of travel, paying for first class if they need the extra assistance and a pillow under their seat or economy if they just needed to get to there from here in a hurry. We could depend on students to find their own way to the learning 'gates' that would lead them to their destination. And while it may be a little more expensive to provide students with the infrastructure they need to make their own choices, the results would be better: they would be far more likely to arrive at their destination of choice instead of, say, Latvia.

But as much as I like my first thought - and I do like my first thought - I like my second thought better. Over the last five years or so we have all been struggling with the need to deliver educational content in chunks through a distributed learning network, an effort very similar to the airlines' handling of luggage. Our conception of a chunk of learning content - or a learning object, as the current jargon has it - is that it is about as intelligent as a piece of luggage. And like a piece of luggage, it sits there in a repository, waiting to be found, waiting to be directed, assembled, placed in its seat in the airliner of learning, waiting to be delivered to eagerly waiting students clumped together around the carousel on the concourse.

Learning objects are like luggage. I don't know if I've seen that exact analogy employed in any of the many papers on learning objects, but the descriptions I have seen suggest the metaphor. 'Digital images or photos, live data feeds (like stock tickers), live or prerecorded video or audio snippets, small bits of text, animations, and smaller web-delivered applications, like a Java calculator' [2] - doesn't this sound like 'socks and shorts, a toothbrush, camera and electric razor?' And doesn't 'webpages that combine text, images and other media or applications to deliver complete experiences, such as a complete instructional event' sound like 'suitcase, carry-on bag and backpack?'

Gerard's 1969 description of how 'curricular units can be made smaller and combined, like standardized Meccano [mechanical building set] parts, into a great variety of particular programs custom-made for each learner,' now cited with approval in contemporary learning object literature [3] points to the fundamentally stupid nature of learning objects as currently conceived, objects so stupid that they could not possibly function without a professional instructional designer and a six-figure LCMS in order to be of any use. 'They must be seen in terms of their place in an architectural hierarchy capable of finding, comparing, and selecting them and then joining them together to perform an orchestrated instructional function that requires more than a single object can accomplish unless it is a self-contained instructional product.'

It seems like a lot of work. In order to use a learning object you must first build an educational environment in which they can function. You need, somehow, to locate these objects, and then arrange them in their proper order, according to their design and function. In certain cases - as for example when the object is a Flash animation or a chunk of streaming media - you must arrange for the installation and configuration of appropriate viewing software. And you're still not finished: the objects must now be delivered in some sort of instructionally appropriate context - a problem solving environment, say, with expert models. Sure, it's a lot easier to do all this with learning objects (indeed, we wouldn't dream of doing it without them), but can't we manage learning without having to build the online equivalent of an international airport? Sure we can. We just need smarter learning objects.

So what would it take? We need to stop thinking of learning objects as chunks of instructional content and to start thinking of them as small, self-reliant computer programs. This means more than giving a learning object some sort of functionality, more than writing Java calculators or interactive animations. When we think of a learning object we need to think of it as a small computer program that is aware of and can interact with its environment. This is the purpose of what the authors of SCORM call a 'wrapper,' a set of 'functions that encapsulate the functionality that an AU might use to communicate with the LMS (Learning Management System).'

[4] The idea here is that a learning object is more than just data being pushed around by an LMS, but rather, a piece of computer code that plugs into and actually works with the LMS - or whatever environment it may find itself in.

So how do we move from the concept of a wrapper - which is still pretty primitive - to the concept of a smart learning object? 'Know thyself,' according to Socrates, is the first step on the road to intelligence. As a learning object is being created, it should be created in such a way that the wrapper can learn for itself who the author is, what company or institute the author works for, what day it is, what its name or title is, what format it is, and more. No author should have to type endless fields of metadata; a wrapper, when first created, should initialize by detecting its environment and the nature of its contents. Just as Microsoft Word automatically embeds the authors name, institution, date and other information into each document it creates, so also the wrapper should obtain similar data and create some metadata tags on its own.

When launched, the learning object advances to the philosophy of Rene Descartes, asking, 'what kind of being am I?' A quick scan of the first few lines of content should be sufficient to tell the object that it is a PDF file, or a GIF image, or a Flash animation. It should also be able to find its own size (or dimensions) as the case may be and write a few more lines of metadata. In an ideal world, the learning object would then search through its environment for an appropriate player. If it is a PDF reader, for example, it locates an Acrobat Reader and bundles it with itself. In the same way that a piece of software can be stored as a self-extracting zip archive that automatically installs itself when activated, so also can a learning object become a self-contained executable file

that contains everything it needs to run properly.

And so, thus equipped, the learning object is cast into the air (or ether, as it were). From a short list provided, it seeks out the nearest learning object repository. Each learning object repository indexes data its own way, of course (people long having since abandoned the foolish notion of there being one and only one set of metadata standards for the entire world). It identifies the fields required by the repository and then consults the recommended application profile to learn what possible values could fill those fields. The learning object isn't so smart that it can know what those fields actually mean - after all, what is the Dewey Decimal System to a small chunk of code? - but it knows that if it submits to a scan by the library association's auto-summarizer it can obtain legal values for the repository's DD field. It does this for each field in turn - check the field, check the parameters, then access a web service to fill in the appropriate for itself. After a long, laborious process (almost a whole minute, an eternity for a learning object), it generates a new metadata file, checks a copy of itself into the repository, and then moves on to the next repository in the system where the process is repeated.

Once the learning object has checked itself into a few major repositories it goes to sleep. The metadata it generated sits in the repository, ready to generate a response to a request. Since the learning object repositories are networked, a request from anywhere in the system will eventually reach the learning object. Because the learning object generated detailed metadata, it will be exactly what the searcher was looking for. Nudged into wakefulness by the repository, the learning object sends a message to the searcher volunteering its services. It also checks the repository to see if any reviews have been written or whether it has achieved certification, and if so, offers that information to the searcher as well. It makes some enquiries of the user's system. Does the user have any credit with the appropriate commercial broker (if not, then propose a commercial transaction)? Does the user have the appropriate prior learning (if not, generate another request and then go back to sleep).

Serendipity! The learning object is exactly what the user wanted, and the user is qualified to download and run the learning object. Without waiting for any further instructions, it fires a copy of itself to the user's computer. A quick scan: what language is the user using? Spanish? Quick, access an auto-translation service and reconfigure. Next, obtain the user's preferred font styles and sizes, colours and other environment parameters. Then look at the parameters of the request: send your metadata, says the request, to the following program address. Here's what I am! The learning object proudly announces to the system, and when you need me to start up, just send the following command!

Obviously in this short article I have glossed over many of the details. But the main point of this article is to show that, if we made learning objects a little smarter, they could perform many of the tasks we now envision the hiring of minions of baggage handlers to accomplish. There is no in principle reason why we could not develop smart learning objects: if we can write self-extracting executables, self-pacing audio streams, or applications that report back to Microsoft when you use bad words, then we can write learning object wrappers that perform basic self-analytical tasks, scan the web for web services, and learn about their new environment.

What's more, once we develop an architecture of smart learning objects, we are no longer constrained by the bounds of 'supported' data formats. Should a developer want to deploy a previously unused 3-D multimedia file format, the developer need not wait until the learning management system has built in support or until the user has downloaded a plug-in: everything that's needed ships with the learning object. Should developers become dissatisfied with Adobe's

or Microsoft's file formats (or pricing structures), they can simply write their own presentation application.

Smart learning objects. So much more than learning luggage.

[1] [Attendre le suitcase](#)

http://www.acm.org/ubiquity/views/e_andersen_2.html"

By Espen Andersen, Ubiquity, April, 2002.

[2] [Connecting learning objects to instructional design theory: A definition, a metaphor, and a taxonomy](#)

<http://www.reusability.org/read/chapters/wiley.doc>

David A. Wiley, in The Instructional Use of Learning Objects, David A. Wiley, ed.

[3] [The Nature and Origin of Instructional Objects](#)

<http://www.reusability.org/read/chapters/gibbons.doc>

Andrew S. Gibbons, Jon Nelson and Robert Richards, in The Instructional Use of Learning Objects, David A. Wiley, ed.

[4] [Sample learning Management System](#)

<http://www.flextraining.com/>

Version 2.0. Advanced Distributed Learning.

In the philosophy of mind there is an old saw known as the homunculus theory, which posits that a little man sitting inside our brain handles all our thoughts and beliefs. The problem with the theory, aside from being physically impossible, is that it does not solve the problem of cognition, it just pushes it back a level. In the larger world, though, not only is it physically possible to have little men at the controls, they actually do seem to solve the problems. That's why we have ministers and mentors, teachers and truckers. But the irony is, in a world where we obtain a sufficient degree of connectivity, these homunculi are no longer needed. What's more, we find that they don't actually solve the problem of rationality in a network, they simply push the problem to a specific human brain. Because of this, they are actually counterproductive, substituting authority for rationality. Thus it is with the role of the teacher in the information age, and thus it is that I cast them in a new role, described below.

Aggregators, Assimilators, Analysts and Advisors

Written June 14, 2002. Unpublished.

In his newsletter today, Elliott Masie wrote, "I never balked at paying for a print newspaper, yet this was a bridge to cross before I could feel good about paying for an e-newspaper. Ironically, the paper tells me they have gotten way fewer subscribers than they thought! So, they are playing with their pricing and business models. I am intrigued about readers' thoughts about your own response to paying for e-content, whether it be a daily newspaper or knowledge flows." What follows is my response to him.

The whole question of subscription fees for online newspapers is a useful area of enquiry. The analogy with e-learning is significant, and many of the lessons providers of online learning content are about to learn have already been learned in the online media community.

That said: there are many ways we could approach this whole question, but I will take the simplest and most direct. Why are you paying \$18 per month for something online when you could get it mostly for free? Because there are so many news sources out there, most of what is in your newspaper is freely available. Vin Crosbie has observed on numerous occasions, and I agree, that local content is the only real value a local newspaper has to offer online.

It would make sense to pay a subscription fee only if you could not obtain your local news online. With three city newspapers, you have plenty of choice. But perhaps one day all three will start charging subscriptions. You now face what I sometimes call an artificial scarcity: there is no shortage of supply, however, withholding (often via a cartel, an approach Steve Outing frequently recommends), creates one.

That all aside, is \$18 a fair price for what you are receiving? First, let's not forget that you have had to purchase the reading device (your computer) and access to the distribution system. \$18 a month is comparable to the cost of receiving each issue on your front doorstep. And yet the newspaper is able to deliver this item to you without paying for the newsprint and delivery costs. You should ask why it costs the same for you to purchase a product that costs the newspaper a lot less to produce. Particularly when only a small percentage of the content is useful to you.

This same issue arises in other domains. The RIAA is asking for a rate of [a dollar a song](#) for web music downloads, which amounts to about \$12 a CD, which that same organization reports is the average price of a CD in the United States. Why should you pay the same price when the

producer does not incur the cost of manufacturing the CD and case? By and large, consumers have rejected the proposed pricing with respect to music, and if the evidence that parades through the sources above (Steve Outing's ministrations notwithstanding) is any indication, consumers have essentially rejected that pricing model for online media.

[Juliette Adams](#), in a recent article, articulated the issue nicely. She wrote, "The American market has spoken: an article is worth \$1-5, a 10 hour-course \$50-100, a full-length course \$500-2000. These prices have been set by the aforementioned publishers, journals and academic institutions, my favorite clients withstanding. But if these prices are 'right', then why aren't there more 'eLearners'?"

In fact, you do not have to pay your local newspaper in order to access local news. Leaving aside the Google news search - for my area, [New Brunswick](#) - there is a wealth of alternative sources available online. For people living in larger cities, especially, the gamut of press releases, announcements, web logs, activist pages, and similar sources gives you as detailed a picture as any newspaper. What you are missing, true, is someone to filter all this information and present it to you in a nice format. But the more people are looking at these alternative sources the less people are satisfied with the filtering and writing offered by professional journalists.

A discussion that has of late occupied a lot of ink on the Online News discussion list is the whole area of alternative news sources. Eric Meyer chimes in regularly with the assertion that they are parasites. But there has been a fair number of words devoted to the idea that web logs (blogs) are not only link lists but actually first hand accounts of news events, and therefore, in an important sense, more authentic. [Paul Andrews](#) documents this at length. "Aided by the Internet and personal-computer software, online communities with their own publishing tools and networks are redefining news in the 21st Century."

Educators play the same sort of role in society as journalists. They are aggregators, assimilators, analysts and advisors. They are middle links in an ecosystem, or as [John Hiler](#) puts it, parasites on information produced by others. And they are being impacted by alternative forms of learning in much the same way, for much the same reasons. "By adding to the diversity of original content, weblogs have added a whole new layer to the Media Food chain. That puts weblogs at the base of the food chain, generating the sort of grassroots journalism that the new Media Ecosystem has grown increasingly dependent upon. Because bloggers are closer to a story, they'll often pick up the sort of things that traditional Journalists miss."

One of the things that attracts people to weblogs is the diversity of their content. Everybody knows what to expect from traditional journalists. There's a fairly predictable story style, a fairly predictable political tone, a fairly predictable range of coverage. Weblogs draw from a much wider range of content, style and opinion. Loyalty is bought by bringing a point of view, a perspective, to the aggregation. By not merely listing news articles but describing how they fit into an overall pattern, by expressing an opinion based on a certain set of assumptions. This is not cheap and easy; it requires expertise and commitment.

It's one thing to talk about our being used to paying for printed newspapers, and to talk about it only being fair to compensate editors and writers for plying their craft, but in fact with virtually free global syndication, the substantially reduced cost of publication, and an increasing capacity on the part of the public to speak for itself, such productions and such professionals are not needed in nearly the quantity they were formerly. When we look at what is possible with new media and internet technology, it makes less and less sense to be paying print era prices for online

reproductions of industrial age products.

Indeed, not only are their new modes of news production and distribution, it is arguable that in such a new environment traditional barriers like subscription fees do not create wealth, they hinder it. Most alternative sources of news are free, despite the fact that they represent hours of time and effort on the part of their authors. My own work is a case in point. Would there be a net gain in wealth were I to charge subscriptions for this material or even to run advertising in this material?

My answer to this is no: subscription fees would mean that many thousands of people who could benefit from the material on this site would not benefit. Even the use of advertising makes the distribution of the site in many contexts (such as schools and religious institutions) problematic (assuming the advertisers are willing to support material that undercuts their methodology). Could I make a little money? Yes, maybe even a lot of money. But only at the cost of removing a valuable resource from society. And only, moreover, at the cost of cutting off my own access to similar resources.

What goes around, they say, comes around. I have in turn made use of the extensive body of free information available on the world wide web. By making use of this information, and by sharing freely on my website, I have been able to gain expertise in some fields (one of which, I like to think, includes online publishing). This expertise has helped me to obtain a progression of positions in the online learning and online resource sector. It is true, I do not actually get paid for any of my online work. And true, I must provide actual services in order to earn my salary. But the salary I earn, the positions I hold, would not have been possible to attain without the free sharing of information, both on my part as a gift to others, and by others as a gift to me.

It is astonishing to me that there are some writers, indeed, some entire communities of individuals, who are unable to imagine any form of compensation other than direct payment for services rendered, and who are indeed not even to imagine the possibility that one may gain more from freely sharing information than by hoarding it for oneself. But this is my experience and the experience of not a few, but hundreds, even thousands, of individuals living and working on the web and in related industries. Look around and find any 'guru' or 'expert' or even 'consultant' in any field and you will find a wealth of information distributed for free. These people are by and large earning more money than writers, based largely on their writing, and yet are not paid as writers.

In the old economy, scarcity was wealth. But we do not live in the old economy any more.

Indeed, the very idea of placing a newspaper on the web presupposes access to a wide range of free services. Imagine what it would be like in a subscription-happy world were newspapers to pay the full cost of putting out a web edition. They would have to pay Tim Berners-Lee a whack of money for spending 8+ years of his life providing a free system (HTTP+HTML), pay the U.S. military and dozens of nameless programmers who developed the underlying TCP/IP code, pay large royalties to people (like me, say) who through trial and error demonstrated the feasibility of using the web as a publishing medium at all, pay royalties for each email (POP+SMTP) they send, and more.

While people talk about paying fair compensation for value received, perhaps we ought to examine the conduct of newspapers themselves. Imagine what the news would be like if you had to pay royalties to every accident victim you covered for the use of name, story and photos, pay

and obtain permission from politicians and other flacks who issue press releases, pay and obtain permission to run stories about strikes, lockouts, and other labour conflicts, and so on. Newspapers depend on an environment of free information. Indeed, their essential function is to pick up information that other people have produced, sometimes at great cost to themselves, repackage it, and distribute it in a bundle along with some advertising. "Crash kills 5. Eat at McDonalds."

This is why it is dangerous for newspapers to take the subscription route. The companies most likely to be damaged by putting restrictions on the free flow of information are those companies that earn their livings from the free flow of information. If information becomes a commodity, as some of you are suggesting, then why should I, as a newsworthy (and humble) person, allow you free access to any of it?

The significant issue here, one that is obscured by the day-to-day question of whether we should pay subscription fees for newspapers, music or online learning, is the manner in which the online content industry is being warped in order to protect these industrial mode forms of commerce. The most frequently voice argument you hear, no matter what the domain, is that the author|musician|artist should be fairly compensated for their work, and that this new mode of commerce - whether it be file swapping, online used book sales, or free online academic journals - is endangering that revenue.

But suppose you were prohibited from selling your vehicle as a used car because your sale would cut into the earnings of those who build new cars. That argument seems pretty ridiculous, but it is essentially the same one being advanced by authors opposed to [Amazon selling used books](#). "Amazon's practice does damage to the publishing industry, decreasing royalty payments to authors and profits to publishers," the guild wrote in its message. "There's no good reason for authors to be complicit in undermining their own sales."

I think that a lot of such lobbying is being done by people who have no idea how commerce works. Take me, for example. I pick up a book by John Brunner for a quarter in a used book shop (the real investment, of course, is the time it will take to read the book). I read it, I like it, I pick up a few more used Brunner books, then I start scouring Chapter's for his latest release. That's how it works. Cut off used book sales and it's like you've cut off the oxygen. The same logic applies to most content, online or offline. The software I buy is the software I've been using for free for a while. The NY Times when I'm south of the border I buy because I've become used to reading it for free online. The text I recommend for my class is the one a colleague loaned me over the summer. I don't know what authors and publishers think will replace the churn of ideas that constitutes a free information exchange, but I can tell you this: if you kill off that churn, you kill off the fuel that drives the information economy.

This paper introduces in an overt way another thread in the discussion: the declining value (and therefore cost) of information. In a connected world, our access to sources of information increases dramatically. Where once we were limited by scarce radio frequencies and the cost of print publication, in the information age we are limited only by our cognitive capacities. We have gone in a decade from an era of scarcity to an era of surplus, and it makes no sense to continue to pay the same price in an era of surplus that we paid when information was scarce. This paper runs the numbers and arrives at the conclusion that the value (and therefore cost) of information will be (all other things being equal) two times an order of magnitude less than it was before online communications. I sent the article to Dave Pell. He cut off my subscription. I moved on to other sources. You can't argue with surplus..

Five Choices: Or, Why I Won't Give Dave Pell Twelve Dollars

Written August 21, 2002. Unpublished.

Last week at the New Directions forum in Wisconsin ([summarized here](#)) I suggested that online content providers should get used to the idea that they will not make a lot of money from online content.

"Content is of diminishing value," I said. "We can only keep royalties up by creating artificial shortages."

And I received the usual arguments back. People deserve to be paid. People won't produce content unless they're paid. And my suggestion that people get another job - that's preposterous!

But I look now at the trillions of dollars lost by investors when the dot com bubble burst. Much of this money was lost by companies - like Salon, say, or the Industry Standard, or any of the dozens (hundreds?) of companies that went belly up or nearly so - who thought they could make a go of it by offering quality content on the internet.

Content didn't sell on the net, and it won't sell on the net, because the premises of the rejoinder are false: people sometimes don't deserve to be paid, even if they work hard, because the market doesn't work that way. And people will produce content, even if they don't get paid for the content. The online evidence for this is overwhelming, as two billion free web pages will attest.

But still these business plans were launched on the belief that, somehow, this content or that subscription model is, somehow, different. But the internet is a harsh place, and people learn to become humble in a hurry. Believe me, I know. And so they lost their shirts.

I would like very much to see e-learning avoid this error. This means dashing some hopes (and maybe even a few business plans). It means saying harsh things, sometimes. But if education as an industry loses a trillion dollars, it is not unwitting investors who pay the price. It is colleges, universities, the governments that support them and the students who attend them who must pay the cost.

So, this article. In my email today I received my daily issue of NextDraft, a high quality news summary authored by Dave Pell. Dave has been producing this newsletter for free for some time

now, and he would like to make a business of it. I wrote back saying, in essence, the numbers just won't support it.

What I want to suggest is that *exactly* the same argument applies to online educational content. It's harsh, but it has to be said: you *think* your content is unique, but it's not.

So read on. The numbers are real.

Hiya Dave,

You wrote,

"So I'm looking for places to take NextDraft in the future. One thing I know is that sooner or later, I've got to make this more of a business and less of a hobby. It's too much work for the latter and someone's got to pay for my satellite television addiction. One idea would be to try to get NextDraft picked up as part of an existing publication. Another would be to include ads.

"And here's another. What if NextDraft became a pay service? I'm thinking of something on the very low-end, say about a buck a month. There might ultimately be two versions of the newsletter, one paid and one free (the free one would either be much shorter, have no links or come weekly - or something like that. Any ideas on that would be quite appreciated)."

Dave, I won't be paying 12 dollars a year and I voted "no" on the poll. Not because I don't like NextDraft. Not even because I think all content should be free. But because I am not willing or able to support this model of paid content. It's not personal or even professional. And it has nothing to do with me, really.

I subscribe to maybe 100 newsletters. A number of them are dailies, like yours. Others are weekly or even monthly. At \$12 a pop (a low end figure; most people seem to expect more than \$12) I'm looking at \$1200 per year, which in Canadian dollars is more like \$1800 per year. Or, for me, \$150 per month.

That's not bad, but if you add to that my access costs of \$50 per month, plus the cost of my own computer and equipment - I just spent another \$700 for my wireless home network yesterday - plus odds and ends, and now I'm looking at a pretty hefty bill. Plus the fact that I would have to go out and type my credit card number 100 times (at least I have a credit card; until a couple months ago I didn't - talk about making online purchasing difficult).

All this for significantly less content than I get in my newspaper (for one year, \$172.90) or even the 60 or so channels on my television (one year, \$600). And the newspaper doesn't require me to purchase additional reading devices (though I should include the cost of the coffee I drink with the paper).

As I said, I like your column. I like it about as much as a well written editorial, a story and box score of yesterday's Montreal Expos game, a column by Alan Fortheringham or Gynne Dyer. In my newspaper I'll get about 40 or 50 of these items a day (it's not much of a newspaper). Say 40. That means any given column costs me \$4.30 per year.

So if we consider the \$12 a year you're asking for (which is, again, compared to similar

subscription requests, very reasonable), it is three times the cost of the equivalent cost of a newspaper article. Not counting the cost of my computer equipment and access. And not even considering the fact that you don't have to print it on paper and physically deliver it to my door.

This is my problem. Even leaving aside the inconvenience factor, your content would cost me more than other, more traditional content that is of roughly equal value to me. Three times more. And yet it seems to me that the cost of information online should be substantially less than what I am paying for my paper-based content.

How much lower? In various talks I have talked about the target of "two-times order of magnitude." That means that if a column cost me \$4.30 per year under the old model, I should be looking at 4.3 cents under the new model. Now you might think that this is absurd, but look even at the situation now. If you look at the average cost of everything I read, say, fifteen years ago and compare it to the average cost of what I read today, you can see that this cost reduction has already been achieved.

As I said, I receive about 100 newsletters. Every one of them is free. I also access dozens of web pages daily, read a number of journal articles, and read about 200 emails (tossing out another 200 spams). I also read three newspapers, which I pay for, the odd magazine, part of a book (on a daily average basis). I subscribe to cable, but my radio access (using an old Rockport radio my mother gave me) is free.

Fifteen years ago, radio (on my old Rockport radio) was free, but everything else cost me money. Oh sure, cable was half what it is now, but I got less than half the channels. Newspapers cost about the same. Fifteen years ago I was averaging more than a book a day, some obtained from the library, but most paid for out of my own pocket (according to the movers, I now own about two tons of books). Free content? Once or twice a month I would get a letter (as opposed to a bill or a flyer). I suppose if I had paid the \$20 cents per to send mail I would have received more back.

It should be clear that I pay much less per item today than I did 15 years ago. Easily two-times order of magnitude. Probably more so. So I think I'm on good grounds here.

Now you may say that the information I get is of much lower quality than the information I paid for fifteen years ago. But I would beg to differ. Your own newsletter is a case in point. It is easily of as high a quality as anything in the newspaper now or then. The same can't be said for all the newsletters I receive, but then again, I was never really impressed by Dear Abby yet paid my 2 cents daily for it (fifteen years ago) each day (sometimes two or three times, depending on which papers I read). I read some discussion from Curtis Bonk yesterday which would certainly equal the quality of the same material were he to put it in a book, but with the added advantage that he said it yesterday, not three years ago.

No, I don't think I need to concede anything on the quality side of things. Television fifteen years ago was even more of a wasteland than it is today. The purchase of books was always risky, especially when you shelled out as much money as I did for cheap science fiction paperbacks. Even supposedly authoritative texts, refereed, audited and selected by a university professor, would contain a certain amount of dreck - so much so, in fact, that we would often skip entire chapters in our study of the work.

So, no. It's not that today's content is of significantly poorer quality. Most of it comes from the

same people I would have read in print fifteen years ago, saying the same things (only more recently), in much the same way. I live with a certain amount of poor content, which I dismiss quickly, and I spend most of my days poring over very high quality content. The difference is not the quality. It's that it is cheaper to produce, it's easier to access, and there's so much more of it. That's what drives the cost down.

So finally we turn to the real reason you would like \$1 per month for NextDraft: your desire to make it less of a hobby and more of a business. As you say, it's a lot of work, and like me, you have expenses. I would certainly agree that you're underpaid - earning nothing is underpaid by anyone's scale. You certainly deserve to make a few dollars out of NextDraft, maybe even a living. I know the work that you put into your publication, since I do exactly the same thing for more than 1000 readers with my own newsletter.

You may say, "What's a dollar - 5 cents an issue? Surely it's a fair compensation for all the work that I put into NextDraft." But my point is that it's not fair compensation. The value of your column on the open marketplace is not determined by the amount of work you put into it or even the quality of the content. It is determined by what people are willing to pay, more accurately, what people actually pay, for the column. And columns on the internet average much less than five cents per issue. If we apply the two-times order of magnitude rule, it's more like five cents per year.

The real issue here for you, of course, is not how much I pay per issue or per year. It's how much you earn per issue or per year. Let's run some numbers that would tell us, given the current market for online content, what success would look like. Suppose you wanted to make a living off your column. That's, say, \$50,000 per year (I picked a number that makes everything add up nicely; adjust according to your lifestyle preferences). To earn \$50,000 per year, you need one million subscribers. Probably more, because it's going to cost you a few dollars to send a million emails a day (though, as spammers know, it's not nearly as expensive as you'd think).

One million sounds like a lot of readers when you have a few thousand subscribers. But ask yourself, how many newspaper columnists have a few thousand readers? Not a one. Daily circulation for newspapers is in the hundreds of thousands. Syndicated columnists can count on a million regular readers. And if we look at a potential worldwide audience of a billion or so people online (give or take 500 million), you can see that you need to reach only a miniscule 1 percent of them to make a living from your column. So it's not unreasonable that you could make your living off your column. But, with market demand for online columns being what it is, and with your circulation being what it is, you have to overcharge to even hope to pay for your satellite dish.

This is the thing. You can say that "you ought to pay" or that you "deserve" to be paid as much as you want, but I am not forced to pay. Should you charge money, I can always decline to subscribe - an option I exercised by selecting "no" in the opinion poll - and to read a cheaper (or free) publication instead. The point is (and I hate to state it so harshly) is that I don't owe you a living, for the simple reason that I could not possibly pay all the people I would "owe a living" under such conditions. No, the relation between you and I has nothing to do with morality, no matter what the advocates of paid online services say. It is a purely market transaction: you offer to sell me a service at a price, I consider my options, and accept or decline.

The other harsh reality is that, if you do go ahead with your subscription model, you should expect to lose roughly 98 percent of your readers (figures vary depending on who you read). So

say you have 10,000 subscribers (which would make yours a very successful internet newsletter, as these things go). You would be left with 200 subscribers. At \$12 a pop, you're looking at \$2400 per year. That's not bad: it will pay for your satellite system.

But don't forget, that's a percentage based on the churn your free newsletter has already generated. People passing it to their friends. People linking to your home page or to your articles. You have to expect this to drop off once you enter the subscription mode. Oh sure, you will still generate some churn your your abbreviated free version, but a lot less, because it's simply not as good as it was. And sure, people may still link, but many fewer, because people don't linke to link to a sign-up screen.

You may generate enough new subscriptions to offset the inevitable attrition. Hard to say. But it seems likely, unless your newsletter is so much better than the free content that it becomes a "must-read," that you will be fighting a never ending battle to obtain subscriptions. This means advertising and other expenses that you may not have counted on. Just to maintain your current 200 subscribers you may find yourself eating into more and more of your \$2400 annual income. And how are you going to advertise to a market that spans the globe?

Your major issue isn't the fact that I won't pay. It is that you are by no means alone. There are hundreds of thousands of blog writers (half a million, according to a recent (free) MSNBC article. On top of that, hundreds of thousands more authors of various sorts, including university professors (each of whom thinks he has the one best way to teach calculus, and that the would ought to pay for it), politicians (who will now and always write for free), sports fans, pundits and consultants, and more. heck, there are even software programs out there that will do much of what you already do - gather relevant news headlines and display them on a page. I know you add a lot of valuable commentary to what you write. So do I - and yet one of my competitors (or it would be, if I were a commercial service) simply harvests topical headlines from PR newswire and has five times more subscribers than I do. It may not be fair that your competition numbers in the thousands, uses automated tools, and produces a lower quality product, but that's life on the internet.

So. You want to make a living with your hobby. In my view, you have limited options.

1. Lower your production costs. That's what some services do. Use a reasonably well-programmed harvester to do most of the work, then take a half hour to add some comments. That way your hobby is more like a hobby again and you don't need to worry about making a living from it.
2. Increase your volume. You may not get a million people to read your one newsletter, but if you managed to get 10,000 people to read 100 newsletters you are obtaining the same result. Unfortunately, you've just increased your workload by a factor of 100, which probably not what you had in mind. You will have to lower your workload by the same amount.
3. Get a million subscribers. For you, probably not a real possibility unless you were to join some sort of larger service that really does have the capacity to reach a million people. You could get a million subscribers by becoming a columnist for the New York Times, for example. For most of us, this probably isn't a live possibility. But it will work for some people.
4. Create higher value content. Let's face it, you are putting out the equivant of a newspaper article. It's good, it's useful, but it's not a "must-read". You can't charge more for it because you

wouldn't be able to charge more for it in the traditional print-and-paper world. But if you were able to generate absolutely unique content that nobody else could offer, you would then have effectively eliminated your competition and thereby increased your market value. That's how companies get away with charging money for stock quotes, for example (of course, having an artificial monopoly on that content helps). Consultants such as Forrester charge more research results than only they have (because they did the research themselves). For most of us, that too isn't really an option: few of us own stock markets or research institutes.

5. Or - as I suggested (to much derision) at a conference the other day, get another job. The fact is, online content production doesn't pay the bills. But it can act as a loss-leader for the provision of other services. By reaching a wide audience with your free online content you are able to display - almost without cost - your unique expertise or skills. You may be able to obtain employment based on these credentials. Or secure consulting gigs or speaking fees. Or you may do some writing for hire for a firm that could use your easy touch with a typewriter. If you have sufficient expertise and credentials, teach an online class.

To wrap up my discussion, let me sketch a small analogy that, in my view, nails it down.

I play darts. I work very hard at my dart game; I practise for a couple of hours a day. I am actually very good at darts and can walk into most pubs and whip the locals. I have invested a lot of my time, energy and sweat into becoming a good dart player. Just like the hundreds of thousands of people who play baseball, basketball or hockey. We do it for fun, and there are enough of us who are good enough to say that we could be on the verge of turning pro.

We're good, but it turns out that there just isn't enough of a market for all of us. No matter how much I practise playing darts, I'm only going to make a few hundred dollars a year, no matter how much I deserve more for all the work I put into it. It's not fair, but sports isn't fair, and professional sports are even less fair.

So my choices as a dart player are much like yours above. I could practise less (of course, my game might not be as good). I could play in more tournaments - though probably I could never play in enough to earn any sort of reasonable money. I could convince more people to watch darts - but I would need to own ESPN in order to pull that off. I could improve my game and maybe win the big prizes. That means being one of the top ten players in the world, though. Or I could write my darts off as a hobby and derive any value I can from it - the contacts that I make, the line on my resume, the improvement in my character, or the use of darts as a great analogy from time to time as I pursue my day job.

It's not a question of right or wrong, fair or unfair. It's just that there are too many dart players and too few people interested in paying to watch darts. There's nothing I can do about it, but I can say this as certainly as I've said anything else: if I charged \$12 a year for people to watch me play darts, nothing's going to change. I still won't get paid any more than I'm making now. And I will have succeeded only in annoying my friends.

Epilogue

See, it is easy to stand at the front of the room in a (sparsely attended) forum and denounce my suggestions as preposterous. It is easy to say that content authors deserve more money, and that anyone who thinks otherwise just isn't in touch with reality.

But the hard numbers don't support the case. The only way to raise the price of online content is to severely restrict the supply. That's why so many LMS and LCMS vendors are signing "exclusive deals" with publishing companies. They know you won't pay several hundred dollars a pop for some B-grade online learning content unless (a) it's the only material available on the subject, and (b) you need it.

It won't last. And even if it does last, I want all of you who are would-be educational content authors to run through the following calculation:

How much did you earn from publishing journal articles and books last year? Take one percent of that? That's how much you will earn from online content.

Now, for those of you creating your online *magnum opus*, you may be thinking something like this: but I'm already making more than that. I got a \$40,000 grant or project or dispensation to create this content.

Well yes. *You* got \$40,000. But the *content* is unlikely to earn \$40,000 back. Not in a free and open market. Do some *real* calculations: outside of your own course, how many institutions and professors used your online content? How much did they pay for it? How much did you actually put in the bank over and above your own salary?

See, everybody is in the "loss-leader" frenzy right now. The golden era before the bubble bursts. They're drawing a salary, but very few are really selling content. Oh sure, the commercial vendors have established a (temporary) corporate market for (custom) content. But the colleges and universities?

Like it or not, your five options are the same as David Pell's.

1. You can lower your production costs by employing content authoring tools, reusable learning objects, and low paid (graduate student) labour. But this impacts the quality of what you offer.
2. You can dramatically increase your production of courses. This means lowering production costs. And even then, you probably won't be able to lower production costs enough.
3. You can get a million students (if you're the Open University or the University of Phoenix) per course.
4. You can create higher value content, content so good and so unique that people will *have* to pay for it. But fair warning: it had better be *really* good - better than MIT's, which is already online for free.
5. Or you can give up on the dream of making money from content and get back to your *real* job, providing an education. Your content will get people in the door. And it will make your job of providing a service easier. Cheaper for students. But it won't pay the bills.

In May, 2000, I wrote my paper Learning Objects. It was a summation of the work that I had started with The Assiniboine Model and The Future of Online Learning. The paper had a wide readership and was arguably one of my most important publications. It appeared in IRRODL the following year. Some time later, Maxim Jean-Louis of Contact North asked me for an updated version of the paper. Many months later, I sent him this work, renamed and expanded to reflect developments in the field and a growing awareness of the network since I had published the original piece. I have no idea what the actual publication date was, or even the actual completion date; it became The Project That Would Never End. I presented it at NAWeb in October, 2002 and finally decided I was finished writing it. Though a much more internally consistent and complete treatment of the same topic as Learning Objects, it achieved nothing like the same readership. It's all in the timing, I guess. It is included here as a survey of the field, a summary, if you will, of 'what is known' about learning objects and their distribution. It's almost impossible to understand the material that follows without this basis, so though long, it forms a central and essential component of this book.

The Learning Object Economy

Written October, 2002. Published by Contact North, 2003.

Learning (lîr n ĩng)
n.

The act, process, or experience of gaining knowledge or skill.

Knowledge or skill gained through schooling or study. See Synonyms at [knowledge](#).

Psychology. Behavioral modification especially through experience or conditioning.

Object (Ńb j ĩkt, -j ěkt)
n.

Something perceptible by one or more of the senses, especially by vision or touch; a material thing.

A focus of attention, feeling, thought, or action: an object of contempt.

The purpose, aim, or goal of a specific action or effort: the object of the game.

Grammar.

A noun, pronoun, or noun phrase that receives or is affected by the action of a verb within a sentence.

A noun or substantive governed by a preposition.

Philosophy. Something intelligible or perceptible by the mind.

Computer Science. A discrete item that can be selected and maneuvered, such as an onscreen graphic. In object-oriented programming, objects include data and the procedures necessary to operate on that data

Economy (ĩ-kŏn' ə-mē)
n. pl. e·con·o·mies

Careful, thrifty management of resources, such as money, materials, or labor: learned to practice economy in making out the household budget. An example or result of such management; a saving.

The system or range of economic activity in a country, region, or community: Effects of inflation were felt at every level of the economy. A specific type of economic system: an industrial economy; a planned economy.

An orderly, functional arrangement of parts; an organized system: “the sense that there is a moral economy in the world, that good is rewarded and evil is punished” (George F. Will).

Efficient, sparing, or conservative use: wrote with an economy of language.

The least expensive class of accommodations, especially on an airplane.

Theology. The method of God's government of and activity within the world

Abstract

The intent of this essay is to provide a comprehensive overview of learning objects and related topics for the non-technical reader.

First, some common arguments identifying a need for learning objects are described and through an examination of the problems identified a description of learning objects is obtained.

Second, the development of learning objects is placed into a theoretical context by identifying the underlying concepts in computer science, standards initiatives and distance learning theory from which they evolved.

Third, learning objects are looked at from a practical point of view. Tools and techniques for creating learning objects are described. The method of preparing learning objects for reuse is outlined. Then the delivery of the objects in a learning environment is described.

Fourth, the learning object economy as a whole is developed. This is the system of learning object repositories, distribution systems and rights management. A variety of initiatives and technologies are introduced.

A. The Need for and Nature of Learning Objects

This section describes the need to design online courses in such a way as to reduce costs without diminishing the value of a university education. We need to do this by extracting what these

courses have in common and by making these common elements available online as learning objects. This section describes the need for learning objects and then offers a definition of learning objects drawn from the description of that need.

i. The Idea of Learning Objects

There is no consensus on the definition of learning objects. Definitions abound and numerous analogies are employed to elucidate the concept. The basic idea, by virtue of its simplicity, allows wide latitude for interpretation. Learning objects are intended to support online learning. They are intended to be created once and used numerous times. Because they are delivered online, they are intended to be digital objects. And because they are used in learning, they are intended to have an educational component.

The Lego Analogy. A popular metaphor for learning objects is a set of Lego blocks. Though the use of a simple design, Lego blocks may be reused and combined into a variety of different combinations. As Wiley writes, the idea is that any Lego block can be combined with any other Lego block, Lego blocks can be assembled in any manner you choose, and Lego blocks are so simple anyone can use them. (Wiley, 1999)

The Atom Analogy. As Wiley notes, the Lego analogy is too broad for many conceptions of the learning object. Some learning objects do not fit well together. The nature of learning objects may restrict what can be created with them. And learning objects are probably more difficult to use than Lego blocks. Accordingly, Wiley proposes that learning objects are more like atoms than Lego blocks. Learning objects are the basic components of, say, online courses. But different learning objects function in different ways.

Consensus? Digital reusable objects to support learning. Most discussions of learning objects agree that learning objects are digital, reusable, and are intended to support learning. The IEEE (2002) defines learning objects as “any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning.” Wiley (2000) settles on a definition of a learning object as “any digital resource that can be reused to support learning.” Even so, as Wiley comments, “the definition is broad enough to include the estimated 15 terabytes of information available on the publicly accessible Internet.”

A functional definition. Probably no definition of learning objects will ever be sufficient; there will always be those that say the definition allows too much or too little. Part of the purpose of this paper is to approach the subject of learning objects from a different direction: rather than to say what they are, this paper attempts to show the problems learning objects are intended to solve and the manner in which they are used. In other words, this paper is intended in part to provide a functional definition of learning objects.

The Learning Object Economy. The functional definition of a learning object offered at this juncture is that a learning object is anything that is exchanged in what may be called the learning object economy. As this paper will show, the learning object economy is a complex of networks and systems intended to support learning, a vast learning mill. Learning objects, whatever they are, are the grist that circulates through this mill. Learning objects are the raw material used to support learning; the learning object economy is the network designed to produce and distribute that raw material, and the eventual definition of learning objects will depend on what people want to receive at the output end of that mill.

ii. The Case for Online Learning

We need accessible and affordable learning. The need for and usefulness of online learning is today no longer in question, but to understand the need for learning objects it is useful to reflect on the factors that led to the development of online learning. And though the availability of the technology was a key factor, the primary driver behind the development was a widespread need for accessible and affordable learning.

Dimensions of accessibility. In a world where many or most people have access to the internet, online learning promises to make learning more accessible. Accessibility has numerous dimensions. Among the most frequently cited (as in DOI Online, 2002) are timeliness (online learning may be used any time of the day or night), accessibility (online learning may be accessed from almost anywhere), and flexibility (online learners can proceed at their own pace).

Accessibility as choice. To a large degree, accessibility may be defined as choice. As Vail (2001) writes, "Students turn to online classes and schools for varied reasons, but they have one thing in common: They all want or need something that's not easily available in the traditional brick-and-mortar school building. Students in rural communities can take classes such as Latin or AP calculus that their schools are too small or too poor to offer. Sick or hospitalized students can finish their class work without falling behind. Gifted students, students who have problems in the regular classroom, students traveling with their parents."

Accessibility as lifelong learning. Accessibility may also be defined as having the opportunity to continue learning while employed. An Open University study noted for example that "an increasing number of people do not want to study for three years before embarking on a career. Instead they want to combine starting a career and studying as soon as they finish school." (Major, 2002) As Human Resources Development Canada (HRDC 2002) noted "With 50 percent of the workforce of 2015 already in the labour market, and a smaller projected youth cohort, Canada must take action now to ensure we can meet the skills needs of the economy.... A broad-based, accessible and comprehensive adult learning system must be a prominent feature of the country's learning infrastructure."

iii. The Cost of Online Learning

Traditional courses are typically created by a single artisan. Though instructors in traditional classrooms use common course materials such as textbooks and journal articles, each time a course is offered by a school, college or university, it is created from scratch. And although instructors sometimes use core curricula and often use the same course outline one year to the next, these are adapted and localized on a case by case basis. The task of creating a course in the traditional classroom, therefore, resembles what may be described as a cottage craft industry: it depends on and reflects the skills and inclinations of an individual artisan.

Online courses are also typically created by an individual artisan. Modern schools, colleges and universities developing courses for online delivery have migrated this strategy into their internet offerings. Although supported by teams of designers and web specialists, courses are essentially the product of individual teachers or professors. And though common materials, such as course packs or other online learning resources, may be used, the online course is essentially created from scratch each time it is delivered. Like traditional teaching, online teaching today is labour intensive, and therefore, expensive.

Example: Tony Bates. Examples abound, but this process is typified in *Managing Technological Change* by Tony Bates. According to Bates, a course costs \$24,4000 to develop, taking 30 days of a subject expert's time seven days of an internet specialist's time, and additional time for copyright review, academic approval and administration. Delivery costs an additional \$13,161 per year. To cover these costs, students in Bates's course pay \$463 or \$695 in course fees, plus an additional \$177 for required readings.

Example: A generous estimate of 5 man-hours per manual page would result in 1000 man-hours for a 200 page manual, which could be covered in 40 hours. At a burdened rate of \$60/hour, the in-house development cost would be: \$60/hour development cost x 1000 hours = \$60,000. If an outside consulting firm did the job, it would cost: \$120/hour x 1000 hours = \$120,000. (Kurtus, 2001)

Example: Using the 50 percent time-reduction estimate specified in step 1.4, it is assumed that the CD-ROM training would only require seven student hours. Therefore, estimated cost of development is 7 hours x \$50,000 per hour = \$350,000. (Kruse, 2002)

Online courses are therefore at least as expensive to develop as traditional courses. Almost all online course developers use the design model Bates describes. It involves a course being developed from scratch, using nothing more than a traditional university course or a good textbook as a guide. The course author typically authors all the content, including examples and demonstrations, quizzes and tests. Because of the cost of development, there is little use of course specific software or multimedia. The course is then offered to a small number of students over a limited time, resulting in course fees that are comparable, if not greater than, traditional university course fees.

We can do so much better than this. We need to design online courses - even university courses - in such a way as to reduce these costs without diminishing the value of a university education. We need to do this by extracting what these courses have in common and by making these common elements available online.

We can create better online course materials. Consider the Teacher's Guide to the Holocaust. This site consists of dozens of resources on the Holocaust may be used and reused by any teacher approaching the subject. Each of the 'class activities' could be treated as an individual learning object. The Holocaust is a very large subject - much larger than sine waves - and is appropriately divided into many components. But it is far easier, and of far greater quality, to assemble a lesson or series of lessons from these materials, than to create something from scratch.

Example: Hamlet. There is not of course one single description of Hamlet, but there is only one text of the play Hamlet and it is not a stretch to envision a definitive online multimedia edition. A course specializing in Hamlet would employ the digital Hamlet as a central resource, and incorporate as well essays, discussions and articles from scholars around the world. Such an edition would not only contain the text, it would also contain video clips, audio clips, commentary from selected sources, pop-up glossaries, and more.

We can lower the cost of learning: It is not a stretch to imagine a multimedia company spending a million dollars on such a production. Assume that Hamlet is taught in 10,000 schools, colleges or universities around the world (hardly a stretch). Assume 20 students per class (an underestimate, to be sure!). At \$5 per student, the company would make it's million back in one year! The economics are very good, and this excellent resource would be cheaper than even the book alone.

iv. The Argument for Learning Objects

Define learning objects by defining the problems they solve. What are learning objects? To answer this question the best approach is to describe what problems learning objects are intended to solve, and thereby, to describe what learning objects are designed to do. In this first section, then, we begin by describing the problems. In later sections, we will look at approaches to solving these problems. This will in turn allow us to extract a list of defining features of learning objects.

The problem: online educational content is expensive to produce. Online educational content is not cheap. Even a plain web page, authored by a mathematics professor, can cost hundreds of dollars if you take into account server costs and the professor's salary. Include graphics and a little animation and the price can double. Add an interactive exercise and the price can be quadrupled.

If each institution produces its own materials the cost multiplies. Suppose that one description of the sine wave function is produced. A high quality and fully interactive piece of learning material could be produced for, say, a thousand dollars. If a thousand institutions share this one item, the cost is a dollar per institution. But if each of a thousand institutions produces a similar item, then each institution must pay a thousand dollars, or the institutions, collectively, must pay a million dollars. For one lesson. In one course.

The cost is reduced by sharing similar learning materials among institutions. The economics are relentless. It makes no financial sense to spend millions of dollars producing multiple versions of similar learning objects when single versions of the same objects could be shared at a much lower cost per institution. There will be sharing, because no institution producing its own materials on its own could compete with institutions sharing learning materials.

To solve the problem of cost, learning materials will be shared. Economics, then, dictate that we need to be able to share learning materials between institutions over the internet. But this raises a host of issues. What sort of materials can be shared? How might they be created? How do we account for the content that does change from one institution to the next? And from the millions of objects on the internet, how can we find the one item we need for a particular course at a particular time? These issues and more need to be resolved, and so we need to look at the problem of sharing more closely.

<http://www.careo.org/vision/TomCarey.ppt> Tom Carey, A Vision for Online Learning Objects

at the University of Waterloo, Building a Vision for Sharing Education Objects in Alberta, 2001?

v. Courses? No, Not Courses

The problem: what will be shared? If we accept the premise that institutions will share learning materials, then we need to ask, what will they share? What size will they be? This is sometimes known as the problem of the granularity of learning objects.

Postulation: we will share courses. The answer that intuitively offers itself is: courses. Existing listings of online learning materials, say TeleCampus (see below), list only courses. Good listings, they are divided into subject areas, where each subject page contains a list of similar courses offered by different institutions.

Courses are what students purchase from institutions. These directories are directed at potential consumers of learning material, that is, students. Students are typically motivated by an interest in a topic and select courses from the list of offerings in that topic. Moreover, students are typically offered learning materials in course-sized units, and attempt to complete degree or diploma programs defined as sets of related courses.

Institutions already share courses to a degree. Why, then, would institutions not share these courses? To a certain degree, they already do so. Most colleges and universities define course articulation policies, whereby a course completed at one institution is accepted for credit at another institution. A good example is the Baccalaureate Core Course Equivalency defined by Oregon State University for courses at thirteen regional community colleges.

http://www.orst.edu/Dept/admindb/arttable/scr1140_arttab.htm.

Course articulation is an example of sharing courses. Course articulations are the result of complex negotiations between teams of academics. Consider, for example, the information contained in the Illinois Mathematics and Computer Science Articulation Guide. <http://www.imacc.org/articulation/> To count as equivalent credit for, say, a trigonometry course, a candidate course must require certain pre-requisites and contain material covering a certain set of topics.

However, course articulation is complex and regional. Because of the regional nature of course articulations – it is notable that Oregon State University has made no attempt to articulate courses offered by, say, community colleges in Florida – and because of the detailed topic-by-topic definition or articulation agreements, course sharing between institutions is difficult to define and maintain. It is unlikely that any course could be shared by any significant number of institutions in different states or different nations.

Courses offered by institutions vary widely. We see this disparity reflected on online course listings. Returning to the Telecampus guide we find twenty separate history courses listed. No two of the courses share the same name. And though a number of courses focus on the same region and time period, no two of the courses share the same contents. This is true to more or less a degree across all subjects and across all institutions. Although courses may share elements in common, it is rare to find two courses from two institutions that share the same, and only the same, set of elements.

So we will not share courses. Courses themselves are not suitable candidates for sharing. Yet the dominant form of online education today is the course. So it should come as no surprise that there is very little sharing of educational resources, even online resources, despite the tremendous cost savings.

Conclusion: we will share parts of courses. What needs to be shared may be best described as parts of courses, or more accurately, course components. From this it follows that we need not only collections of course components but also some mechanism of assembling course components into complete courses. This may be thought of as the problem of packaging learning objects. In the sections that follow below we will first explore the idea of what sort of things can be shared as course components, and then we will look at the problem of packaging.

vi. Sharing the Old Way

We best understand sharing by looking at existing examples of sharing. To best understand the

concept of sharing course components, and go get an intuitive understanding of what may constitute a learning object, it is useful to look at how and why learning materials are shared in traditional classrooms. It is important to review the “old ways” of sharing resources not only to show that resource sharing is an established fact in today’s classrooms, but also to point to some of the elements of resource sharing already in place.

Today’s classrooms already share learning materials. If we describe ‘sharing’ as meaning ‘one centrally produced resource used by many,’ then today’s classroom is already an example of extensive resource sharing. Various publishers and content producers produce resources centrally and distribute them to classes around the world. And while many of these resources are distributed for free, the majority of shared resources in classrooms are purchased from their respective producers or intermediaries.

An example of sharing: the textbook. The clearest example of resource sharing “the old way” in today’s classrooms occurs through the use of textbooks. These resources bear all the hallmarks of sharing: they are centrally produced and obtained as needed by classroom instructors around the world. In many cases, the information in textbooks is so commonly used the work becomes standard.

An example of sharing: classroom displays. But textbooks are just one type of item among many that are shared by classes around the world. No K-12 school is complete without a set of wall maps in geography classes, periodical tables of the elements in science classes, and sets of large block letters for the early years. A rich and useful set of classroom displays is distributed by organizations as varied as astronomical societies, museums, and publishing companies.

An example of sharing: multimedia. In the area of multimedia, teachers employ a wide variety of centrally produced materials including filmstrips and videos, CD-ROMs and other software, presentation graphics and even complete learning resources, such as are produced by Plato.

Sharing today involves the buying and selling of learning materials. Neither the producers nor the consumers of those resources would describe the distribution of textbooks, classroom displays or multimedia “sharing.” Textbook publishing and sales, especially, is a lucrative industry. The National Association of College Stores estimates U.S. / Canadian college store sales to be \$8.959 billion for the 1998-99 academic year. Nonetheless these classes are sharing resources as defined. They are produced centrally and used by many institutions.

Sharing today involves decomposition. Instructors frequently employ only components of purchased learning materials in their classes. Many course syllabi require that students obtain more than one textbook. They may use, for example, only a few chapters out of a textbook. In class, they reassemble these selected materials in a way that meets their instructional goals. (Wiley, 2000)

Sharing today involves sharing parts of courses. In many cases, the resources sold by publishers and distributed to classrooms are not entire courses, but rather, components of courses. This is most clearly the case for classroom aids such as wall maps and posters. Sometimes also students purchase only parts of courses, such as lecture notes or workbooks. And students frequently photocopy only parts of books (or parts of journals) in their research and reading.

vii. Contemporary Online Sharing

Many agencies offer educational materials for sharing, but problems exist. In the traditional classroom, course components such as textbooks, classroom aids and multimedia are bought and sold and then combined by teachers and students to support classroom instruction. On the internet, though most educational institutions offer complete courses only, many other agencies have started offering smaller, more portable learning materials. These materials fall short of what we will later define as 'learning objects', but they offer some insight as to the direction and potential of online resources.

Canada's SchoolNet. In Canada, the leading learning resources portal is probably Canada's SchoolNet. A list of resources is displayed, each with a short description and a link to an external website. SchoolNet also provides information about each site and provides an "advanced search" using metadata. Each resource in the "curriculum" area is approved by a professional "pagemaster". For the most part, however, SchoolNet links to institutional home pages, and not to learning resources per se. Teachers using the SchoolNet service must still search through these sites in order to locate suitable materials. <http://www.schoolnet.ca/>

Merlot. Linking directly to learning resources themselves is a site based in the United States and maintained by the Educational Object Economy Foundation. Merlot currently lists more than 2,000 learning applications that can be accessed via the world wide web. These applications are specific materials on specific topics; for example, Merlot lists such items as "Chaucer", "The Great 1906 Earthquake and Fire" and RSPT Expansion (Perturbation Theory). Materials are sorted into category and subcategory and have been contributed by educators from around the world. Educators attempting to use Merlot's resources, though, will still experience frustration. Although the topic hierarchy is more detailed than SchoolNet's and although much more focused resources are listed, educators would still have to spend quite a bit of time searching for materials. <http://www.merlot.org>

MarcoPolo. MarcoPolo is a compilation of teaching resources from six educational institutions which provide free internet content for K-12 education. What the six partners have in common, and what makes this an important and interesting development in online learning, is an adherence to national curriculum and evaluation standards in the subject areas. Material is categorized by grade level and individual items are matched to individual learning topics. Despite its strengths, however, MarcoPolo is a closed project; only the six member institutions contribute content. There is no centralized search facility and no metadata listings for the resources. <http://marcopolo.worldcom.com/>

XanEdu. Xanedu is a learning resource site that collects articles from journals, magazines and other resource providers. Instructors may compile 'course packs' consisting of collections of these materials; students who subscribe to XanEdu may access these course packs. The materials are sorted by category and may also be located using a search mechanism. Like MarcoPolo, however, XanEdu is a closed project. It draws materials only from selected publishers. And while it allows subscribed students to browse through its materials, the vast bulk of resources available on the internet cannot be found through XanEdu. <http://www.xanedu.com/>

Problem: it is difficult to locate relevant learning materials. The internet contains a wealth of learning materials. But even with the help of portals, these learning materials are hard to find and hard to use. The portals need more robust mechanisms for updating and submissions. They need much better systems of categorization and searching. They need to be tied more closely to

learning objectives, but in such a way as not to be tied to a specific curriculum. This would allow materials directly relevant to a given course topic to be quickly located. (Schatz, 2001)

Problem: existing portals offer access to only a fraction of available materials. Though the resources offered by learning materials portals are very good, and in some cases, very comprehensive, no portal offers more than a fraction of the materials available on the internet. Materials available from one portal are not available from other portals. And because publishers sign exclusive agreements with certain portals, they are blocked from wider access except through that portal.

Problem: there is no consistency in the materials offered. An even greater weakness appears when we look at the collective set of learning resources (or applications, as Merlot calls them) offered by these. It is almost not possible to identify consistency in format, scope, methodology, educational level or presentations. Some resources include lesson plans, but many others do not. Some are authored in Java, others in HTML, and others in a hybrid mixture known only to the author. Some involve ten minutes of student time, others would occupy an entire day. And there is no structured means for an instructor to know which is which.

viii. What We Need

Learning objects are defined by the problems they solve. What would we need to implement the sharing of course components online? We would need something similar to the initiatives described in the previous section, but something that addresses the weaknesses of those initiatives (and in fairness, each of these initiatives is taking steps to address these weaknesses). The description of an online entity that addresses these problems forms the basis for a definition of learning objects.

Learning objects are sharable. By 'sharable' what we mean is that a learning object may be produced centrally and used in many different courses. Sometimes people speak of this criterion by saying that learning objects must be reusable. This is accurate to the degree that it means that learning objects may be used over and over again. But equally important is the idea that they are used by different educational institutions.

Learning objects are digital. By 'digital' what we mean is that they can be distributed using the internet. While for the sake of argument some people could talk of physical entities (such as textbooks or maps) as learning objects, such objects cannot be used online and therefore are not part of an online course.

Learning objects are modular. A learning object is not an entire course, it is a part of a course. Therefore, in order to create an online course, learning objects must be assembled or packaged into a larger entity. This what we mean by 'modular' - that collections of learning objects may be assembled into a single, larger unit. This in turn means that, as Longmire asserts, learning objects must be 'free standing, nonsequential, coherent and unitary.'" (Longmire, 2000)

Learning objects are interoperable. By 'interoperable' we mean that learning objects produced by different publishers, or available through different repositories, may be packaged together into a single course. An instructor creating a course using learning objects must be able to select from all available learning objects, not merely a selected subset of proprietary learning materials offered by a single provider. Or as Singh writes, "the...framework must allow content and their data to be exchanged and shared by separate tools and systems connected via the internet."

(Singh, 2000)

Learning objects are discoverable. By 'discoverable' we mean that the appropriate learning object for any given instructional application can be located in a reasonable amount of time by a person who is not necessarily an expert at searching the internet. Just as an average person could go into a library and, using the catalogue system, locate a particularly useful book, so also an average person should be able to go online and locate a particularly useful educational resource.

In conclusion, learning objects are digital materials used to create online courses where these materials are sharable, modular, interoperable and discoverable.

B. Learning Objects from a Theoretical Perspective

The design of learning objects is similar to the design of software objects in computer programming. In this section, we look at some of the theoretical assumptions underlying modern software programming.

ix. Course Construction and RAD

Today's online courses are like old computer programs. People typically think of an online course as being similar to a textbook, or at best, a classroom where a course is being delivered. But from the standpoint of online course design, it makes more sense to think of an online course as being similar to a computer program. This is especially evident when the problems facing early computer programmers and computer users are compared to the problems facing today's online course designers. Early computer programs were written from scratch. They were expensive and time-consuming to create. Moreover, they didn't work with other programs: a document created by one program could not be read by another program.

Modern programmers use rapid application design (RAD). Software engineers have long since learned that it is inefficient to design applications from scratch. Educators need to learn design techniques learned by the software industry long ago, and in particular, they need to learn a concept called 'Rapid Application Design' (RAD). Rapid Application Design is a process which allows software engineers to develop products more quickly and of higher quality. RAD involves several components, including a greater emphasis on client consulting, prototyping, and more informal communications.

Modern programmers use programming environments. In modern programming, the engineers' re-use of software components within the context of a CASE (computer-aided software engineering) environment. The idea of RAD for software development is that a designer can select and apply a set of pre-defined subroutines from a menu or selection within a programming environment. A good example of this sort of environment is Microsoft's Visual Basic, a programming environment that lets an engineer design a page or flow of logic by dragging program elements from a toolbox.

Analogies: the well prepared chef and mechanic. Similar methodologies exist for a wide variety of creative or constructive tasks. A professional chef, for example, will carefully design a kitchen environment so that when he is called upon to create Crepes Suzette, the essential ingredients -

including pre-mixed recipe ingredients. Auto mechanics also work in a dedicated environment and also have at hand every tool and component they may need to fix anything from a Lada to a Lamborghini.

RAD will be applied to course design. Online course developers, pressed for time and unable to sustain large development costs, will begin to employ similar methodologies. An online course, viewed as a piece of software, may be seen as a collection of re-usable subroutines and applications. An online course, viewed as a collection of learning objectives, may be seen as a collection of re-usable learning materials. The heart - and essence - of a online course design is the merging of these two concepts, of viewing re-usable learning materials as re-usable subroutines, applications and documents assembled by application specialists in a computer assisted software environment.

RAD is being used in corporate learning already. Educators in the corporate and software communities have known about this concept for some time. As Wayne Wiesler, an author working with Cisco Systems, writes, "Reusable content in the form of objects stored in a database has become the Holy Grail in the e-learning and knowledge management communities."

x. Object-Oriented Design

Object-oriented programming is essential to RAD. At the core of Rapid Application Design, and therefore central to construction and organization of learning objects, is another concept from computer programming, object-oriented programming (OOP). The idea behind object-oriented programming is that bits of software common to many computer programs are designed as self-contained entities (or 'objects') when are then used by different computer programs. It is these objects that are assembled by an application specialist.

Example: Windows task-bars. Any person who used Windows is familiar with objects. At the top of Windows programs is a solid bar, called the 'task bar', in which the name of the program or document is displayed and which contains the 'maximize' and 'minimize' buttons. When a software engineer designs a program screen for a Windows application, the engineer does not write dozens of lines of programming specifying the task bar's location, dimensions and colour. He or she, working within a visual environment, simply selects and drags the 'task bar' icon onto the page being designed.

Example: JavaScript alert box. In a similar manner, a person using Javascript to design a web page application does not write detailed programming specifying the size, location and colour of the alert box that pops up on web pages. The JavaScript programmer simply writes a single line of code creating the alert box and giving it some text to display.

Example: the Student Object. The task bar and the alert box are examples of objects. In a similar manner, software objects can be used in online courses. Suppose, for example, a course designer wanted some educational text to refer to a student by name. When creating the document, the designer would first create a 'student object.' When created, the student object automatically retrieves information about the student, for example, the student's name, and inserts it into the document text.

Objects are defined as prototypes. To generate a student object, a programmer designs a prototypical student and for it properties common to all students. Many properties of the prototypical student would be undefined, however, such as the student's name, age, or phone

number. These unknowns would be given placeholder values (or 'defaults') until they are defined. When a program needs to work with a student, it refers to the prototype and 'clones' a copy of the prototype in the computer's memory (it's actually called 'cloning' in computer science - in perl the prototype is cloned and 'blessed' to reserve its place in memory). The newly cloned prototype is given a name, and then values or attributes are assigned to it. For example:

Objects are used by designers working within the programming environment. When a designer needs to refer to a student, the designer refers to the prototype and 'clones' a copy of the prototype in the computer's memory (it's actually called 'cloning' in computer science - in perl the prototype is cloned and 'blessed' to reserve its place in memory). For example, the designer may click and drag the 'student' icon onto the page being designed. The newly cloned prototype is given a name, and then values or attributes are assigned to it by the program.

Objects can perform functions. The course designer can make cloned objects do things by referring to pre-defined functions in the object (or, in computer terminology, 'methods'). To have Fred Smith register in a course, for example, we would execute a command that tells the student object to perform a function called register(). The course into which Fred is registering is itself another object. When the function register() is executed in Fred, the Fred-object communicates with the course-object and executes a related function in the course object, add_student().

Objects interact with each other. Objects may interact - or more generally, be related to each other, in many ways. The most useful and common form of interaction is the containing interaction. Just as Fred may contain various other objects (such as a heart or a liver, most obviously, but also \$4.95 in change, a six inch ruler and a pager), one object may in general contain one or more other objects. A course may contain students, for example. Or a course may contain units or modules. A unit may contain a test. Each of these items is an object, defined from a prototype, which may interact with other objects in predefined ways. In a course which contained both a unit test and a grade book, for example, the unit test could interact with the grade book. What would happen is that Fred (the 'student' object) would interact with the test (the 'test' object'), which in turn would interact with the grade book (a 'grade book' object).

***xi.* Open Standards**

Open standards are like common languages. A third major concept drawn from the world of computing science - and especially from the recent emergence of internet technologies - is the use of open standards in course construction. An open standard is like a language understood and used by everyone. Just as, for example, the meanings of such terms as 'Paris', 'the capital of France', and 'European' are understood by almost all speakers of English, so also in an open standard are the meanings of terms and definitions widely understood and shared.

Example: HTML. The open standard with which most online educators are familiar is Hypertext Mark-up Language, or HTML. This language is a shared vocabulary for all people wishing to read or write internet documents. The term '<h1>' is commonly understood as a header tag; the term '<I>' denotes italics.

Open standards are contrasted with proprietary standards. Open standards may be contrasted with proprietary, or closed standards. Consider a document written in an older version of MS Word, for example. This word processing program used a special set of notation to define italics, bold face, and a wide variety of other features. Because other software manufacturers did not know these standards, only people using MS Word could read a document written in MS Word.

Open standards enable programs to interact with each other. The purpose of open standards is to allow engineers from various software or hardware companies develop devices and programs that operate in harmony. A document saved in an open standard could be read, printed or transmitted by any number of programs and devices.

Three major types of open standards. There are three major types of open standards. The transport protocol defines how digital material is transported over the internet. The internet is based on transport protocols such as HTTP and FTP. The second major type of open standard is the mark-up language, which defines how parts of documents should be identified and displayed. HTML is a type of mark-up language. The third major type of standard is the program interface. The program interface defines what functions (or methods) can be called by one program in another. A web browser uses a program interface, for example, when it displays a plug-in such as a Flash animation or a Java program.

Learning objects require mark-up languages and program interfaces. Insofar as online learning is delivered using the internet, it can use common transport protocols such as HTTP. However, the documents and programs used in online learning are unique to online learning, and therefore, there is no existing set of mark-up languages and program interfaces for learning objects. Therefore, before we can use learning objects, we need to define each of these. The next few sections will discuss efforts to establish common standards for online learning specifically.

xii. A Common Mark-up language

Online learning uses XML. The common language adopted by online learning designers is - and being adopted by database programmers, librarians and designers around the world - is the eXtensible Markup Language, or XML, developed by the World Wide Web Consortium.

XML represents documents according to their structure. XML is a means of representing documents according to their internal structure. Each element of the document structure is denoted with some standardized script, known as a 'tag'. For example, in a book, the chapters, chapter titles, and paragraphs would each be denoted with individual tags. The collection of tags used in a document is known as the document's 'mark-up'.

XML tags. XML tags are very simple. The beginning of the document element - say, a chapter - is identified by the name of the element in angle brackets, like this: <chapter>. The end of the chapter is identified by a second tag, this time with a forward slash included. Like this: </chapter>. Any text between these two tags is a part of the chapter.

XML tags are nested. XML tags can be nested, which means that the content between two XML tags - between, say, <chapter> and </chapter> - can contain additional XML tags. For example, a chapter may have a chapter name and a block of text. Thus, the chapter would be defined as follows:

```
<chapter>

  <name>Chapter One: A Day in the Shire</name>

  <body>Once upon a time there was a land...</body>

</chapter>
```


In a similar manner, a course containing units, modules and exercises may also be represented in XML.

```
<course>

  <name>Introductory Psychology</name>

  <lesson>

    <name>Lesson One: Freud and his Ego</name>

    <body>Sigmund Freud, an Austrian psychologist...</body>

  </lesson>

</course>
```

XML tags are defined by schemas. In order for tags to be used by many developers, there must be some common understanding of what tags are allowed, what they may contain, and what they mean. Otherwise, what one developer understands to be a course may by another developer be understood as being only a lesson. Essentially, there needs to be a dictionary of tags. Thus, designers using XML refer to documents called schemas to define the tags they are using.

XML tags can be used to describe things. Some types of documents cannot contain XML tags. An image file, created using the GIF format, for example, cannot contain XML tags. However, the image can be described using XML. This is useful because it allows designers represent information about the image which may not be stored in the image itself such as the photographer, the date the image was created, the copyright holder, and more. The XML file used to describe the image contains this information and then points to the location of the image on the internet. Any document - including XML documents - may be described in this way.

Metadata is data about a document. We use the term ‘metadata’ to denote data that is about a document as opposed to data that is a part of the document. Thus, for example, the metadata for the book titled ‘Moby Dick’ includes the book’s title, its author and its date of publication. The document itself is the text that begins after the words, “Call me Ishmael...” Metadata is extremely useful. Metadata may be stored in one location while the document may be stored in another location, thus allowing for centralized directories of objects distributed all over the internet. And metadata can be used to describe more than just documents: it can be used to describe people, computer programs, classrooms, AV equipment, and indeed, anything that can be described.

xiii. Common Program Interfaces

Program interfaces allow programs to work together. Suppose a designer is creating an online course and wants to use an innovative interactive quiz provided by an educational publisher. Using the course design environment, the designer would click and drag the quiz into the course, just as she would any other learning object. In order for the quiz to work properly with the course, however, it must be able to communicate with other elements of the course. For example, it must be able to find out which student is taking the quiz and to be able to report the results of the quiz back to the course. What the quiz and the course need is a program interface: a way of speaking

to each other.

Three types of program interfaces: Launch, API and Data Model. There are three major types of program interfaces: first, a means of telling when the program has started and stopped; second, a way to communicate directly with the other program; and third, a way of defining the type of data that can be exchanged between the programs. These are called the Launch, API (Application Program Interface), and Data Model respectively. The Launch reports when the object has started and stopped. The API reports on the internal state of the program (reporting errors, for example). And the Data Model is used to track the status of the content of the learning object.

Program interfaces are vendor-specific. There are many ways for a learning object to communicate with a course. Learning objects may be written in a variety of computer languages, such as C++ or Java, or they may be program specific files, such as Flash animations. Depending on how the learning object was created, it may interact with the course using Java applets, Microsoft's active server pages and Common Object Model (COM) components, CGI programs such as perl, or Common Object Request Broker (CORBA) components. Commonly, the program interface is accessed through JavaScript calls that ensure that the content is "wrapped" with the means to establish communications with the course once it begins to execute.

xiv. Standards and Standards Based Initiatives

Standards initiatives define schemas and program interfaces. In order to enable the sharing of learning objects, a variety of standards initiatives have been undertaken. These standards initiatives have two major tasks. The first is to define the names of the XML tags, their allowable values, and their meanings in online learning. And the second is to define the launch, API and data models used by program interfaces. Not all standards initiative define all of these elements, and some standards initiatives 'piggyback' on others, extending or more clearly defining elements of the standards in question.

The purpose of standards initiatives is to enable interoperability. Initiatives, such as the IMS Consortium (see below), are intended to promote the widespread adoption of specifications that will allow distributed learning environments and content from multiple authors to work together (in technical parlance, "interoperate").

By "distributed learning environments and content", the standards authors mean different sets of learning materials, authored in different programming languages using different programs and located on different computers around the world.

Interoperability amounts to programs being able to interact. This is an elusive goal. It amounts to enabling content produced using Blackboard and stored on a computer in Istanbul - an interactive atlas, say - to be used in a course authored in WebCT and located in Long Island, New York. And by 'used' what is meant in this context is that the two elements - the atlas and the course - could interact with each other; the atlas, for example, might report to the course how long a give student spend studying cloud formations, and the course might instruct the atlas to display the appropriate university logo and links to discussion boards.

In order to interact, programs must use common definitions of objects. In order for this to work, the atlas in Turkey and the course in the United States must define similar objects in a similar manner. For example, both programs must understand what was meant by 'course', or 'institution', or even 'logo'. Thus there is a need to obtain a common definition of the objects and

properties used by the two separate systems. Thus, the core of the IMS specification involves the definition of prototype objects (or more accurately, descriptions of prototype objects, since they would be defined differently using different computer languages). The IMS Enterprise Information Model, for example, defines a 'Person Data Object', a 'Group Data Object', and a 'Membership Data Object'.

The difference between standards and specifications. Not all standards initiatives are the same. Some initiatives, referred to as specifications, are intended to capture a rough consensus among practitioners. They are descriptive of current practice in the field, often incomplete, and often the work of an ad hoc consortium. (Lim 2001) By contrast, standards are regulatory principles formally endorsed by a standards body such as IEEE or the World Wide Web Consortium (W3C). Typically, we would think of specifications as leading to standards, but this is by no means always the case.

The difference between schemas and application profiles. As mentioned above, standards initiatives define, among other things, schemas. Schemas – also sometimes called namespaces (Bray, et.al., 1999) – define the XML tags that can be used in a given type of XML document. In practice, however, any given enterprise is likely to use a number of schemas for specific purposes. For example, an e-learning company may use both an e-learning schema and an e-commerce schema to create its own customized schema. This customized schema is called an application profile (Heery and Patel, 2000). Application profiles may draw on one or more existing schemas, but cannot introduce new data elements. They may specify permitted values and they can refine standard definitions.

xv. E-Learning Standards Based Initiatives

Following is a list of some major e-learning standards based initiatives, sorted by category. It should be noted that there is some room for interpretation as to whether an initiative is, say, a specification or an application profile.

Specifications

Dublin Core: The Dublin Core is a metadata element set (or schema) specification intended to facilitate the discovery of electronic resources. It lists common elements of electronic documents, such as the document title, author and publisher. The original workshop for the initiative was held in Dublin, Ohio in 1995. Hence the term "Dublin Core" in the name of the initiative. The Dublin Core forms the basis for many metadata schemas, including those used by librarians and those used in online learning. <http://dublincore.org/>

IMS. The Instructional Management System Global Learning Consortium, Inc. (IMS) is a consortium of educational institutions and private corporations developing and promoting open specifications for online learning activities. IMS standards include standards for locating and using educational content, tracking learner progress, reporting learner performance, and exchanging student records between administrative systems. The standards include content packaging specifications, learning content metadata, and some program interface specifications. <http://www.imsproject.org/>

ARIADNE. ARIADNE (Alliance of Remote Instructional Authoring and Distribution Networks for Europe) and ARIADNE II are European Union research and technology development projects in "Telematics for Education and Training." The projects focused on the development of tools and methodologies for producing, managing and reusing "computer-based pedagogical elements and telematics supported training curricula" (learning objects and computer assisted learning). Along with IMS, ARIADNE was one of the major contributors to the IEEE Learning Object Metadata Standard (see below). <http://www.ariadne-eu.org/>

Standards

IEEE P1484 . The Institute of Electrical and Electronics Engineers (IEEE) is an association of engineering and electronics professionals that set electronics and computing standards. IEEE's Learning Technology Standards Committee (LTSC) oversees a set of standards for learning objects that may be identified collectively as P1484. The most important of these is P1484.12 (Learning Objects Metadata, known generally as IEEE-LOM). Other standards - such as those measuring student competencies - are incomplete or exist only as proposed projects. <http://ltsc.ieee.org/>

Application Profiles

AICC. The Aviation Industry CBT (Computer Based Training) Committee (AICC) has developed a set of nine Guidelines & Recommendations (AGR's) defining various aspects of computer based training. The AICC standard is important is provides a test for AGR-010, "web-based computer managed instruction". The certification test verifies that the learning object can communicate launch and program information to the course. <http://www.aicc.org/>

SCORM. Created by ADL (Advanced Distributed Learning), a partnership of commercial, educational and government organizations, the Sharable Content Object Reference Model (SCORM) is a set of standards intended for use by organizations providing learning to the U.S. military (and therefore, to military organizations in allied nations). ADL's SCORM draws on the IMS protocols and extends them, defining course metadata and program interface specifications. ADL also provides tests for interoperability, called 'PlugFests.' <http://www.adlnet.org/>

CanCore. A Canadian metadata standards initiative, CanCore is a "stripped down" version of the IMS standard. The CanCore specification takes a middle-ground approach between the minimalism of the 15-element Dublin Core Metadata Initiative (DCMI) and the massive 70-element IMS specification. The 34-element CanCore specification also provides a set of guidelines for the purpose and use of each element. <http://www.cancore.ca>

xvi. Classifications of Learning Objects

Classification helps in retrieval. Many of the issues related to learning objects address issues surrounding how to classify learning objects. The reason classification is important is that classification defines features that will be important when searching and retrieving the objects. For example, a Grade 3 teacher looking for an illustration of a frog to show for a few seconds to her class will not find it useful to retrieve a college-level week-long seminar on frogs and frog behavior. Classifying both the time of use and the level of difficulty would ensure that the teacher retrieves only appropriate objects.

Metadata is used to classify learning objects. The specifications, standards and application

profiles described above are intended to aid in the classification of objects. The IEEE draft standard for learning object metadata (IEEE, 2001), for example, includes fields for catalogue entries, semantic density, aggregation level (or granularity), and more. These fields are intended for use by automatic filtering programs that aid in document searches.

Extending the Standard. The IEEE-LOM and similar standards should not be seen as limiting the classifications and descriptions available to metadata authors. IEEE is explicitly committed to the extensibility of the standard, which means that additional data elements may be added as needed through the classification and other fields. (Dublin Core Metadata Initiative, 2000)

Extended classification using the classification field. Both the IMS specification and the IEEE standards also include a 'classification' field that is intended to provide "elaboration and extension of the meta-data." (Wason, 2000) The classification field provides descriptions of the learning object that might not be provided for in the rest of the metadata. Several such types of descriptions (or purposes) have been identified: discipline, idea, prerequisite, educational objective, accessibility restrictions, educational level, skill level and security level.

Classification values are determined by taxonomies. A taxonomy is an ordered classification of information using a controlled vocabulary of words and phrases. (Wason, 2000a) Taxonomies are typically defined by a library (or library association), such as the Library of Congress, or by a subject-specific professional association, such as the American Mathematics Metadata Task Force. To define the classification of a learning object, both the source of the taxonomy and the object's classification within the taxonomy must be stated.

Some common taxonomies (from Wason, 2000) are listed below. This partial list is intended to provide examples of the range and origin of taxonomies available for use in learning objects.

LCSH: Library of Congress Subject Headings. Originally by the Library of Congress designed as a controlled vocabulary for representing the subject and form of the books and serials, it has become a tool for subject indexing of library catalogs in general, including a number of online bibliographic databases. <http://www.tlcdelivers.com/tlc/crs/shed0014.htm>

Yahoo. Although Yahoo is thought of as a search engine, it is comprised of an extensive set of classifications, though (as Wason points out), not necessarily in terms of sub-disciplines. <http://www.yahoo.com>

McRel. Content is organized in terms of educational standards for K-12 educational materials. At the top level, McRel uses a subject-based taxonomies consisting of 14 items. <http://www.mcrel.org/standards-benchmarks/>

Taxonomy of Educational Technology. This taxonomy describe a new way of classifying uses of educational technologies based on a four-part division suggested by John Dewey: inquiry, communication, construction, and expression. <http://www.lis.uiuc.edu/%7Echip/pubs/taxonomy/index.html>

2000 Mathematics Subject Classification. A complex classification of common topics in mathematics. <http://www.ams.org/msc/>

American Mathematics Metadata Task Force. Proposed subject classifications for school and college mathematics. <http://mathmetadata.org/ammtf/taxonomies/>

Medical Subject Headings. The National Library of Medicines's controlled vocabulary used for indexing articles, for cataloging books and other holdings.

<http://www.nlm.nih.gov/mesh/filelist.html>

Other types of classification within the Standard. In addition to the classification field, other fields in the IEEE-LOM can also refer to external taxonomies. For example, the 'Learning.Resource.Type' field and point to an external classification of learning resource types, such as the Gateway to Educational Materials (GEM: See <http://www.thegateway.org/>) and specify a value, such as 'Curriculum', from that taxonomy. (Suthers, 2001)

C. The Practical Application of Learning Objects

A non-technical description of how individual learning objects are created and how courses are created from collections of learning objects

xvii. Creating Learning Object Content

We start by describing how individual learning objects are authored. While today most guides and references discuss online course authoring, since courses are composed of learning objects, the proper starting point is to discuss the authoring of individual learning objects. As defined above, learning objects may be any digital object, which means they may be any element - a map, a web page, an interactive application, an online video - that might be contained inside a course.

Two major components of learning objects: the content, and the wrapper. Learning objects consist of the learning object content, which is the actual instructional material in the learning object, and what may be called the wrapper, which consists of metadata describing the object and standards compliant program interfaces. We might think of authoring learning objects as akin to authoring pieces of a puzzle, in which case the content is the image or picture on the surface of the piece, while the wrapper is the shape of the piece itself which allows it to fit snugly with the other pieces.

HTML is not a suitable medium for content because it is not portable. Today by far the most common medium for content is hypertext mark-up language (HTML). The problem with these HTML pages is that they're not portable. A web page designed for one course at one university will contain course and university specific information: the name of the course, the name of the university, and even a colour scheme. To be used or adapted by another course, the pages need to be redesigned. Moreover, HTML pages do not display well in multiple formats. A separate version must be created if, say, the page needs to be delivered over wireless access protocol (WAP) or if it is input as data for analysis by a Javascript or CGI process.

Portability requires separation of content and presentation information. In order to be portable, a document's content must be, first, structured, and second, separated from presentation information. A significant step in the right direction is to create course materials not in HTML, but rather, in a structured mark-up language such as XML. This goal is accomplished by XML, which uses tags to structure information and which refers presentation information to a separate document entirely, an XSL file. An XML file will identify the chapter titles in a document; an XSL file will say that chapter titles should be printed in 24pt red Helvetica text.

Content is authored using content-specific XML authoring tools. Rather than use a single tool,

such as a generic XML editor, content authors use tools designed for specific purposes. For example, an author will use one tool to author a journal article, another tool to author a multiple-choice quiz, and another tool to author a simulation. These tools will generate XML output specific to the type of document being authored. Different versions of XML are used for different parts of courses, such as Math Mark-Up Language (MML), Scalable Vector Graphics Language (SVG) and the Synchronized Multimedia Integration Language (SMIL).

Hot Potatoes. Already, we have seen some content-specific authoring tools, one of the most popular being Half-Baked Software's Hot Potatoes, a tool for designing online quizzes. Authors using Hot Potatoes select the type of interactive exercise they wish to design, then fill in fields in a form with things like the question text, answer options, feedback content, and other elements of a quiz or exercise. The output code is generated automatically by the software as a stand-alone piece of learning content ready to be inserted into an online course.
<http://web.uvic.ca/hrd/halfbaked/>

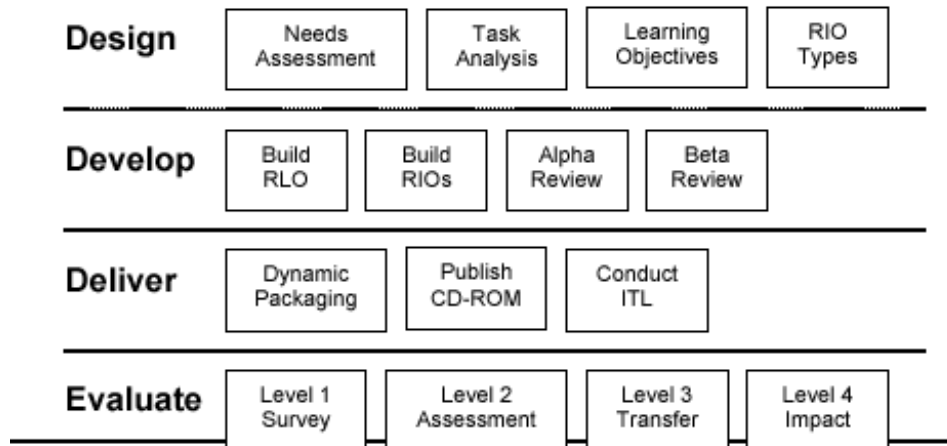
Virtual Cell Modeling and Simulation. The Virtual Cell program is used for modeling and simulating cell processes. Users can access biological and mathematical frameworks are encompassed within a single graphical interface, run the simulation, and output the results. Simulations can be exported in XML format. <http://www.nrcam.uchc.edu/>

Many vendors offer suites of content authoring tools. It is unusual to see content development tools dedicated to a specific form of content. More common are content authoring tool suites, such as offered by Macromedia, Dazzler, Trainersoft or x.hlp. Authors working with a content authoring suite first select the type of content they wish to author, then enter content information in the space provided. Authors can also import elements, such as graphics or multimedia, created using other tools. Content authoring suites typically also offer means of linking different content components together so that an author could, for example, write a lesson containing some text, an animation and an online quiz. <http://www.e-learningcentre.co.uk/eclipse/toolbox/authoring.htm>

xviii. Creating Learning Content

Learning objects meet instructional objectives. While some writers (such as Downes, 2001) depict learning objects as instructionally neutral, other writers (such as Friesen, 2000) argue that learning objects must contain a pedagogical component, that is, they must be directed toward some instructional objective. The purpose of a learning object, on this view, is to teach something.

Creating learning objects is similar to creating instructional content. Though the exact process varies from institution to institution, the creation of learning objects follows a pattern similar to that used to create instructional content. Almost all learning object authors follow roughly the same sequence of steps, characterized by Cisco Systems (2000) as: design, develop, deliver, and evaluate.



Design is based on learning needs. Though the method may vary from instance to instance, the design phase begins with an analysis of learning needs or desired learning outcomes. In a corporate setting this may be defined by a task analysis and an assessment of the knowledge an employee must have at each stage of the job. In a traditional instructional setting this may be determined by curriculum and educational standards bodies. The outcome of the design process is a list of concepts to be learned, each of which may be associated with various content elements, exercises and assessments (RIOs, in the diagram above).

Develop according to design specifications. The development of a learning object involves the writing, creating or assembling of educational content (which may include other, smaller, learning objects). The internal structure of learning objects varies, depending on the developers design model. Cisco (2000), for example, proposes that a learning object is composed of about seven information objects where each information object consists of content items, practice items and assessment items.

Deliver using multiple delivery media. Learning objects may be delivered as web-based courses, packaged as instructional materials on a CD-ROM, or employed by instructors as support materials for a traditional classroom lecture. With the advent of robust wireless internet access, delivery in remote locations will be enabled. And with the advent of web services, delivery through other applications (such as, say, a customer relations management (CRM) tool) will be possible.

Assess at multiple levels. Most institutions use some variation of Kirkpatrick's 1959 description of four levels of assessment (Kirkpatrick, 1998). The first level, survey, measures whether the learners liked the instruction. Assessment, the second level, determines whether the learner met the learning outcomes defined in the design stage. The third level, transfer, examines whether the learner uses the new skills on the job or in practice. Finally, the fourth level measures the impact of the learning in a wider context. Companies with a strong eye to the bottom line may consider employing a fifth level, one which explicitly measures the return on investment (ROI). (Setaro, 2001)

xix. Creating Metadata and Wrappers

HTML defines metadata with meta tags. Most HTML authors are familiar with an earlier version of the wrapper, the meta tag. Located in the head of an HTML page, a meta tag is used to provide

information about the document. Commonly used meta tags include the keyword tag and the description tag. While once commonly used by search engines, the abuse of meta tags by unscrupulous web site owners seeking to increase traffic has rendered them generally unusable.

Metadata is usually generated automatically by the content authoring tool. Most content authors will not author metadata directly. Rather, content authors using a tool such as Macromedia's Dreamweaver can generate metadata automatically using the metadata editor command.
<http://www.eduworks.com/LOTT/macromedia.htm>

Metadata may also be stored in files external to the learning object. Although metadata is closely associated with the learning content, it may be stored in a separate file. For some types of files - such as a .gif image - this is a necessity, since .gif images cannot contain XML tags. And while other documents - such as XML pages or MS-Word document - may contain metadata expressed in XML, for reasons of size it may be more convenient to store the metadata separately from the document itself.

Metadata for legacy content is generated using conversion tools. A lot of educational content exists as plain HTML, MS-Word or databases. These were created before metadata assumed an important role in online learning. To convert this content into sharable learning objects, metadata must be created. While metadata could be created by hand, it is more efficient to use a metadata tool that reads legacy documents and automatically generates metadata. (Haven't been able to find one so far, though)

Learning objects require wrappers. To be compliant with all learning object standards, learning objects also require wrappers. A wrapper is a set of code, usually written in JavaScript, that tells the course where to find information about the learning object's program interfaces. For most content, the program interfaces are very simple. For example, if the content consists only of a document, the course needs to know only that the document has been opened or that the document has been closed. These can be handled by simple and standard Java applets, and hence, a very simple JavaScript pointer to these applets can be employed as a wrapper.
http://www.eduworks.com/LOTT/Mm-LOTT/SCORM_RTI_help.htm

Wrappers can be generated automatically by the authoring system. Most content authors will not create their own wrappers. Though relatively new, wrapper generation tools are becoming available with educational content creation software. For example, Macromedia has just (December, 2001) released an extension for DreamWeaver that automatically creates SCORM 1.2 compliant wrappers. There's no good URL. Go to
<http://www.macromedia.com/resources/elearning/> and search for 'SCORM wrapper'

xix. Creating Packages

Courses are packages of learning objects. Learning objects created using content authoring tools are typically small, consisting of no more than the equivalent of an hour or two of instructional time (there is some debate as to how small a learning object may be and whether educational content must contain pedagogical features, such as a statement of learning objectives, in order to qualify as a learning object). Most educational institutions deliver larger chunks of instruction, called courses. To create a course, therefore, a set of learning objects must be assembled into a package.

Packages organize learning objects sequentially. In order to create a course out of, say, a dozen

lessons, where each lesson is a separate learning object, a course author arranges these lessons into a sequence (it is worth noting that sequences are not defined within individual learning objects; they are defined by course authors). In some cases, where the learning objects are smaller units, course designers may need to create lessons composed of a sequence of individual modules, then the course as a whole out of the sequence of lessons. However created, the sequence of objects is used to define course-specific entities as the course outline or table of contents.

Learning objects are nested. When a collection of learning objects is organized into a sequence, the resulting product is also a learning object. Hence, a lesson composed of individual modules may be a learning object and would need its own metadata and wrapper. A course composed of lessons is similarly a learning object with its own metadata and wrapper. Each of these objects is created and stored in a database. The contents of this database are available to course authors. Some databases may be available over the internet, while other databases will be available only internally.

Packages are defined using manifests. The package is described in XML. IMS defines a specific set of XML tags used to describe a manifest. The manifest is like the shipping label for the package, detailing the contents of the package. The table of contents is an ordered representation of the titles of each item. The metadata for learning contents themselves may be actually contained in the package, or pointed to by a line in the page. Similarly, resources themselves may be contained in the package, or pointed to by a line in the package (obviously, non-textual resources, such as images, must be pointed to).

Packages are created using a Learning Content Management System. While a course author could locate and assemble learning objects by hand, it would be tedious and unproductive to do so. Courses created using learning objects are typically created using a development environment called a Learning Content Management System (LCMS). The LCMS performs two major functions: it provides authors with a means of locating learning objects, and it assembles them into standards compliant learning packages (or courses).
<http://www.learningcircuits.org/2001/aug2001/ttools.html>

Essential components of an LCMS. Though many types of LCMS are available, the typical LCMS will contain four essential features: an authoring application similar to the computer assisted software environment (CASE) described above, a collection of learning objects (called a repository), a means of sending the completed course to a delivery system (called a delivery interface), and administration tools.

<http://www.internetttime.com/itimegroup/lcms/IDCLCMSWhitePaper.pdf>
<http://www.internetttime.com/itimegroup/lcms/>

Using an LCMS. Using an LCMS, a course author defines major features of the course: its topic area, say, or its grade level. The author then instructs the LCMS to search through the learning object repository for relevant resources (because the data is in XML, the search can be very precise). From the search results, the author may review a learning object or select it for inclusion in the course. The LCMS retrieves the object metadata from the repository and inserts it into the course package. The LCMS automatically adds institution-specific formatting (such as the preferred colours, typestyle or wordmark) and prepares the package for delivery.

The LCMS is essentially a CASE. The learning content management system contains the essential features of the computer assisted software engineering environment described above. Learning objects, as defined by the various standards bodies, function in the same way as

software objects (in an important sense, they are software objects). Thus, the use of learning objects within an LCMS allows course designers to emulate software engineers using rapid application design. The time and effort required to create learning materials is reduced substantially.

An LCMS usually also contains content authoring tools. The LCMSs offered by commercial vendors today do much more than merely assemble learning objects into courses. They are also bundled with one or more content authoring tools or may be used in conjunction with an authoring tool such as Dreamweaver. Thus, working within a single development environment a content author can create a repository of learning objects and then assemble those learning objects into complete courses.

xx. Delivering Courses

Courses are packages delivered by a learning management system (LMS). Once assembled, courses are delivered to a learning management system (LMS). The purpose of a learning management system is to provide a student direct access to course materials. Learning management systems typically restrict access to registered students, thus, courses offered via an LMS is usually locked behind some sort of password or authentication process.

An LMS integrates educational activities. In addition to providing access to course content, an LMS will provide access to a number of learning support tools. The most common of these include discussion areas and message boards, chat rooms, online quizzes and tests. The LMS provides a course navigation structure for the student, including a table of contents (or lesson plan), links to discussion areas, and access to repositories of files and supplementary materials.

An LMS provides student tracking and gradebook services. The LMS is frequently preferred by instructors because it automates many administrative functions. The LMS will track student progress through the course and will collect and display a students grades through a gradebook facility. The LMS manages the student's registration in the course and sometimes interacts with other campus services, such as PeopleSoft, to coordinate student registration and grade recording.

WebCT. One of the most popular learning management systems, WebCT (or Web Course Tools) is used by thousands of institutions worldwide. WebCT was popularized by its low price (though this is changing) and its practice of negotiating province or state-wide licenses covering dozens of institutions. <http://www.webct.com>

Blackboard. Blackboard is similar in form and function to WebCT and create a niche in the educational market by offering free course hosting as well as LMS services. This allowed educational institutions, especially smaller ones, to offer courses without having to set up their own web server. Blackboard it is also available for purchase. <http://www.blackboard.com>

Hundreds of LMSs available. There are hundreds of LMSs available.

xxi. Course Format and Display

Courses need to be localized. When a course is delivered in a particular institution, such as at university or within a corporate training environment, the institution frequently desires to customize course content. At the simplest level, this may involve ensuring that the course displays the institution logo. At the most complex level, an institution may wish to customize a

wide range of aspects of the course. Altering the course at the point of delivery is known as localization.

xxii. Pedagogical Issues

Learning Objects are used in an educational context. The delivery of instructional material seldom occurs in isolation. Courses are built, for example, on learning objectives or competencies. A single bit of learning forms a part of a larger picture. This creates a problem in the use of learning objects: how to arrange or sequence learning objects in such a way as to meet pedagogical objectives.

Context has multiple dimensions. It may be tempting to think of context merely as the location of a learning object in a sequence of learning objects. However the context of use involves numerous factors. In addition to content sequencing, these include the domain of discipline in which learning occurs (the difference, for example, between Engineers studying logic and English majors studying logic), cultural environment, organizational goals, and individual learning preferences or learning styles.

One object, multiple contexts. The advantage of using learning objects is that the same piece of learning material may be used in multiple contexts. Context selection may even be viewed as “the second path for personalization of objects (after adaptive selection of appropriate objects based on individual needs).” (Longmire, 2000) Several approaches to contextualizing learning objects are available to course and content developers (the list and terminology is from Longmire, 2000).

Tailored wrappers. As described above, wrappers define how a learning object interacts with a learning management system. One object can have multiple wrappers. Each wrapper then provides a different way to place the object into a specific learning context. While authoring a course using learning objects, an instructional designer might create custom wrappers to be used when the learner accesses that part of the course where the object would be used.

Tailored context frames. Think of a context frame as a generic wrapper describing a particular educational situation. The generic wrapper defines preferences for, say, learning styles, language, or educational background. Or a generic wrapper is created for a particular pedagogical model: one type of wrapper is used for a constructivist approach, another for a problem-based approach. The generic wrapper is applied to all objects being used in a particular course and can, as Longmire (2001) suggests, personal them with such techniques as humor, visual or linguistic themes, or explanations that relate it to a specific body of knowledge.

Adding context links to objects. This is like shaping learning objects so that they interlock like pieces in a jigsaw puzzle. Links are added to the learning objects to point to other learning objects (thus creating a sequence) or to external context (thus linking instruction to, say, educational activities or quizzes).

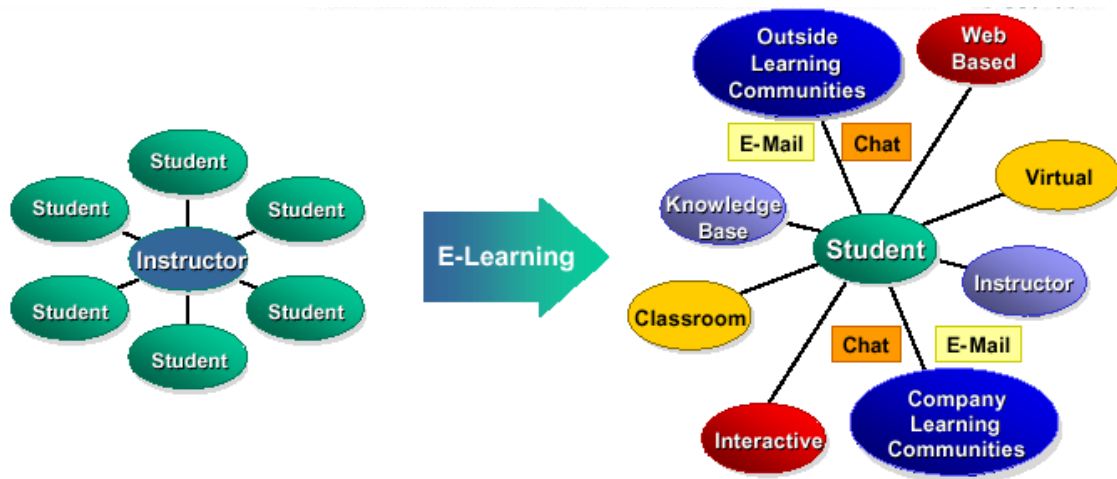
Pattern templates. This is like placing learning objects in the correct location on a checkerboard. Templates based on instructional models and domain-specific sequences provide a data structure for the content of an online course. The selected learning objects are then deployed in the correct location through a process of matching the objects’ properties (as defined by its metadata) to the requirements for each position in the course. Thus, for example, a learning object covering topic

A2 and employing learning strategy G1 would fit into the A2-G1 location specified by the template.

xxiii. Beyond Courses

Learning objects enable custom learning. In the preceding few sections we looked at the use of learning objects to construct courses. Assuming that the promise of learning objects is achieved, and that course construction therefore becomes a relatively simple process, it becomes possible to envision the creation of a unique course for each learner. Learning objects, therefore, hold the promise of the creation of custom courses.

Toward learner-centered learning. Many advocates of online learning are proposing that new learning technology be used with a learner-centered approach to learning. This model replaces what could be called instructor-centered learning. Instead of having each learner dependent on an instructor for the arrangement and provision of learning resources, a learner-centered approach depicts the learner as selecting from a set of available resources.



(Cisco Systems 2001)

Example: the Performance Support Portal. For example, instead of being given a week of orientation, a new employee may be given a short course introducing the performance support portal. “Here he can view performance support tools, read frequently asked questions, chat with others in his position and in the company, look up important information, and ask questions of cyber and human experts. His PSP also tracks his training progress. When his daily training time comes around, his PSP suggests skills he needs to learn. Based on his preferences, the short training bits from which he picks are in his preferred media - movies, animations or text. The trainings he sees are customized for his specific job, based on his knowledge and past training results.” (Schatz, 2000)

D. The Learning Object Economy

This concluding section is intended to show how the development and distribution of learning objects by multiple institutions forms a larger system or educational resources worldwide

xxiv. Course Portals

Course Portals are a mechanism to help students select courses. A course portal is a website offered wither by a consortium of educational institutions or a private company working with educational partners that lists courses from a number of institutions. The purpose of a course portal is to enable a student to browse through or search course listings to simplify the student's selection of an online course.

TeleEducation. A New Brunswick, Canada, learning organization, TeleEducation NB hosts the TeleCampus Online Course Directory. Courses are submitted by institutions and screened to ensure that they are fully online. The database contains more than 50,000 courses, including about 3,000 free courses and 1,200 complete and fully online programs. TeleCampus provides a subject-based directory and search services. <http://teleeducation.nb.ca/>

UNext. Focussing on business education, UNext collaborates with major business schools such as the Columbia Business School, Stanford University and the London School of economics to provide courses in leadership and management, e-commerce, marketing, finance, accounting, and business communications through the private and for-profit institution, Cardean University. <http://www.unext.com>

Hungry Minds. Hungry minds offers more than 17,000 courses through its online campus, Hungry Minds University, from course providers such as the University of California at Berkeley, the University of California at Los Angeles and New York University. Hungry Minds also provides learning content through publishers such as For Dummies, CliffsNotes, and Frommer's. <http://www.hungryminds.com/>

Fathom. Created by Columbia University and including partners such as the University of Chicago, the London School of Economics and Political Science, Cambridge University Press, The British Library, The Smithsonian Institution's National Museum of Natural History, and The New York Public Library, Fathom is a centralized for-profit learning object repository. While Fathom provides lectures, interviews, articles, performances and exhibits, its major focus is an offering of online courses from member institutions. <http://www.fathom.com>

xxv. Course Packs

Course packs are packages of learning materials collected to support a course. Offered primarily by educational publishers, course packs are collections of learning materials offered to instructors for use in traditional or online courses. The course pack may be pre-defined or custom built by the instructor. The instructor is expected to supplement the course pack with additional content, educational activities, testing and other classroom activities.

Course packs are stand-alone or offered through a learning management system. Some course packs, such as those offered by XamEdu, are stand-alone. This means that the course pack is distributed as a separate product and purchased by the student directly through the college or university bookstore. Supplementary educational materials are offered by the instructor on his or her course website or are delivered in a classroom setting. Course packs delivered through a learning management system are more like 'default' online courses. The instructor then customizes the course for delivery online.

WebCT Course Packs. The learning management system WebCT offers course packs consisting

of a course structure and set of readings offered by publishers with a distribution agreement with WebCT. Course packs are purchased by the institution on a seat-license basis and are then customized by the instructor.

xxvi. Learning Object Repositories

Learning object repositories are collections of learning objects or metadata. Learning objects are stored in databases called learning object repositories. There are two major types of repositories: those containing both the learning objects and learning object metadata, and those containing metadata only. In the latter case, the learning objects themselves are located at a remote location and the repository is used as a tool to locate learning objects. In the former, the repository may be used to both locate and deliver the learning object.

Repositories are either stand-alone or included in another service. Most well known learning object repositories are stand-alone. These repositories function a lot like portals in that they contain a web-based user interface, a search mechanism, and a category listing. Another major class of learning object repositories functions more like a database attached to another product. An LCMS, for example, may contain a learning object repository intended for its exclusive use.

Repositories may be centralized or distributed. Two major models for learning object repositories exist. The most common form is a centralized form in which the learning object metadata is located on a single server or website (the learning objects themselves may be located somewhere else). An alternative model is the distributed learning object, in which the learning object metadata is contained in a number of connected servers or websites. Distributed learning object repositories typically employ a peer-to-peer architecture to allow any number of servers or websites to communicate with each other.

Learning object repositories are in a state of transition. Many learning object repositories, and especially stand-alone repositories, are former online course portals (see above). These repositories are in a state of transition, listing and offering both courses and learning objects. Because of the changing terminology and increasing importance of learning objects, course portals will sometimes represent themselves as learning object repositories.

Merlot. Described above, Merlot is probably the most well known learning object repository. Merlot is a centralized repository containing metadata only and pointing to objects located at remote locations. It is stand-alone, acting like a portal for learning objects. In addition to providing search and categorization services, Merlot provides a peer review service provided by communities of experts in different subject areas. <http://www.merlot.org>

Campus Alberta Repository of Educational Objects. CAREO is a centralized collection of learning objects intended for educators in Alberta, Canada. A stand-alone repository, CAREO contains metadata and provides access to learning objects located on remote web servers. <http://www.careo.org>

Portals for Online Objects in Learning. POOL is a distributed (peer-to-peer) repository system under development intended to create a pan-Canadian repository of learning objects. A primary objective of POOL is to develop and distribute tools for creating connected learning object repositories. <http://www.newmic.com/pool/> (not currently functioning). See also <http://www.canarie.ca/funding/learning/1999backgrounders/pool.html> See also <http://www.siliconalleydaily.com/issues/sar08132001.html>

National SMETE Distributed Library. In development for the (SMETE), NDSL is intended as a “federation” of learning object repositories, each library using different document formats, different systems of classification, and different database and repository management schemes. NDSL is intended to join these libraries using a common search engine called Emerge and a method for sharing resources called LOVE (Learning Object Virtual Exchange). (Chen, 2001)

xxvii. Certification and Review

Types quality: content, pedagogy, and compliance. The quality of learning object may be assessed across a number of dimensions. Of these, three major categories may be identified: quality of content, in which the information provided by a learning object complies with what is generally accepted to be true by experts in the field; pedagogical soundness, in which the learning object conforms to recognized principles of teaching and learning; and compliance, in which the learning object may be shown to comply with metadata and learning object standards.

Content quality assessment requires review by experts. The traditional form of content quality assessment in the publishing industry is accomplished by peer review. As mentioned previously, this is the assessment tool employed by at least one learning object repository, Merlot. Learning objects provided by publishers, such as those contained in XanEdu, also undergo a peer review process as part of their having been published in a recognized journal or magazine.

There is little in the way of pedagogical evaluation available. Most learning object repositories offer little or nothing in the way of evaluating of pedagogical standards. Indeed, most such standards are offered informally as a set of recommendations or guidelines for best practice. Probably the only organization that offers an evaluation of pedagogical standards as part of a formal certification program is the American Society for Training & Development (ASTD). <http://www.astd.org/ecertification/>

Standards bodies test for compliance with learning object standards. Compliance with learning object standards involves determining whether learning objects are described with correct metadata and whether the wrappers provided with learning objects operate correctly with learning management systems. As mentioned above, standards compliance is tested by the Aviation Industry CBT (Computer Based Training) Committee and Advanced Distributed Learning.

Evaluation has developed as a proprietary service. As the examples above illustrate, the review and evaluation of learning objects has developed as a proprietary service offered by particular organizations or services. In some cases, such as with ASTD certification or ADL Plugfests, there is a substantial fee involved. In other cases, such as Merlot’s peer review, use of a particular learning object repository is required. In all cases, evaluators are selected by the service or organization; there is no such thing as a genuinely independent learning object review or evaluation service.

xxviii. Publishers and Private Enterprise

The web creates a problem of free content. Many publishers and educational institutions are concerned about the potential Napsterization of education. Napster was a program intended to allow internet users to share music files on the internet. These files were copied from CDs and distributed for free through an indexing service provided by Napster. Though Napster was eventually shut down, a host of similar peer-to-peer music sharing services continued this function. Music publishers therefore faced substantial losses as a consequence of lost sales.

Educational materials could also be shared for free, because students are able to access, and therefore copy, course materials, there is the potential that educational materials could be shared for free over the internet in much the same way music files were shared. The concept of a Learnster has been proposed by a number of organizations, including the University of New Brunswick's Electronic Text Centre and TeleEducation NB. The Open Learning Agency, based in British Columbia, Canada, owns the domain names learnster.org and learnster.com.
<http://www.unb.ca/happening/releases/B989alliance.html>

Access is prevented using passwords and proxy servers. To prevent the unauthorized distribution of learning materials, including journal articles, academic journals have turned to dedicated databases for the electronic distribution of publications. Access to these databases is restricted by password protection, and in addition, viewers must enter the database via a recognized proxy server. Thus, only individuals belonging to organizations that have purchased subscriptions may retrieve and view these publications. The copying and distribution of articles is limited because the identity of readers is known and readers become accountable to their employers for the use of these materials.

Copying is prevented using Digital Rights Management (DRM) technology. To prevent the sharing of educational materials on the world wide web, publishers are investigating digital rights management (DRM) technology. While there are many approaches to DRM technology, they all have in common the function of preventing copying through the use of dedicated readers. One approach requires that students purchase dedicated electronic text readers (sometimes known as e-book readers). Another approach requires that students view text through specialized software programs.

Adobe Content Server. Adobe markets a combination of a document server and reader designed to prevent documents from being copied. Encrypted documents are delivered from the server and can be read only by a version of Adobe Acrobat. The reader will display the document on authorized computers only. The reader may restrict viewing to particular sections of an e-book or restrict viewing to a particular time, such as the duration of an online course.
<http://www.europedrm.com/presentations/clarke.pdf> Mike Clarke, Digital Rights Management for Documents, Digital Rights Management Seminar, 20 November 2001

Digital Rights Management Systems are protected by law. While digital rights management software, such as Adobe's e-book reader, is a tempting target for hackers, the United States has instituted legislation making it illegal to distribute software intended to decrypt protected documents. This legislation, the Digital Millennium Copyright Act, has been emulated in a number of countries around the world. A number of individuals and organizations around the world have been prosecuted under the act for distributing prohibited software.
<http://www.educause.edu/issues/dmca.html>

Growing resistance in the academic community. The use of digital rights management and restricted access databases is meeting increasing resistance by academics who argue that the free exchange of scholarly content is being jeopardized by the new legislation and technology. A number of free online scholarship initiatives have started up with the intent to promote boycotts of subscription-based journals, exchange academic content for free, and lobby for changes to the existing legislation.

Example: The Scholarly Publishing and Academic Resources Coalition (SPARC). The purpose of SPARC is to provide an alternative mechanism for the exchange of academic papers and

research. SPARC encourages journals to provide free or low-cost editions online and lobbies academics to publish their papers in SPACE-endorsed journals only. <http://www.arl.org/sparc>

xxix. The Learning Marketplace

Development of the marketplace model for the collection and distribution of learning objects (see “The Learning Marketplace”, above, for a more detailed discussion)

The online learning economy: a closed marketplace? As the discussion above illustrates, vendors of educational material often link the provision of content to the purchase of a particular service or product. Content providers, in turn, must enter into distribution agreements with those service or product providers in order to reach the market for their content. The result is what might be called a closed market. Access to that market is controlled by what might be called ‘gatekeepers’, in this case, vendors of learning content management systems and learning object repositories.

The closed marketplace excludes most providers of educational content. With the exception of a limited number of name universities and educational institutions, content provided through the major learning object repositories and learning content management systems is provided by major publishers and private corporations. Other colleges and universities, as well as small-scale content providers, are required to partner with a publisher or private corporation in order to gain access to these markets. Such publishers or private corporations obtain the rights to the educational materials and receive the majority of the income.

An open learning marketplace is required. To obtain access to the educational content market, colleges, universities and small educational publishers require access to an open learning content marketplace. Such a marketplace would consist of a distributed (or peer-to-peer) learning object repository. It would also create mechanisms for non-aligned third parties, such as educational organizations, certification agencies and professional associations, to provide independent assessment and review of online learning materials.

An open learning marketplace supports multiple standards. In an open learning marketplace, educational providers may employ their own standards for course metadata. This allows them to select between, say, IMS, SCORM or CanCore. Providers create their own metadata (perhaps using a metadata authoring tool) which is in turn retrieved from the provider’s server (or harvested) by the learning object repository.

Example: Edutella. Edutella is a prototype peer-to-peer network under development that will exchange of educational resources between German universities (including Hannover, Braunschweig and Karlsruhe), Swedish universities (including Stockholm and Uppsala), Stanford University and others. It builds in a structured query service to help users locate materials, an annotation service to allow users to comments on materials, and a mediation service to join data from different metadata sources. <http://edutella.jxta.org/> See also <http://www.cetis.ac.uk/content/20010927163232/viewArticle>

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If The Learning Object Economy represents the cumulation of my preceding thought, this essay marks an important beginning in my present thought. The idea – to which I find myself returning constantly – is that multimedia objects are like works in a new language, and that children today are becoming fluent in this new language even as teachers try to get them to learn the old. Moreover, importantly, what we can learn about the structure of the network that distributes these objects can be learned by the semantics of this new language. The logic of the new literacy is the logic of the network.

The New Literacy

Written October 4, 2002 Published in [Learning Place](#), September, 2002. [USDLA Journal](#), October, 2002. (If that seems impossible, keep in mind that I was several weeks late submitting my work to Learning Place).

Time and again we hear from academics bemoaning the loss of the cultivated and literate student in today's schools, the victim, they say, of a multi-media diet of McDonalds, music videos and post-modernist pablum. Such students fail, moan the critics, to engage in complex dialogue and complex thought. They are capable of understanding only simple and sanitized text, and even then only when it is accompanied with moving pictures and a soundtrack.

I have spent a large part of my working life in the company of the literati, listening to their seminars, attending their lectures, reading their journalistic contributions to the pool of public knowledge. For me, the greatest invention of recent years has been the introduction of wireless networking so I can have something to do while waiting through the interminable gaps in their reasoned arguments. Even while reading, I prefer to have the radio or television playing to occupy my mind as I wade my way through the text. [I am not alone](#) (136k), as one exasperated instructor after another struggles to keep online chat to a minimum during class time.

Scollon (et.al.) calls this polyfocal attention: "Perhaps the most striking thing about our students' attention is that it is polyfocal. That is, very rarely do they direct their attention in a focal, concentrated way to any single text or medium. When they watch television, they also listen to music and read or carry on conversations; traveling on the bus or Mass Transit Railway they read and listen to music-most commonly they 'read' while chatting, watching television and listening to music on CD." (Scollon, R., Bhatia, V., Li, D. and Yung, V. 1999. Blurred genres and fuzzy identities in Hong Kong public discourse: Foundational ethnographic issues in the study of reading. [Applied Linguistics](#) 20(1):22-43) (135k).

Why don't students pay attention to only one thing. Scollon (et.al) suggest that new technology may allow new distractions, but that people have always been polyfocal - but had to content themselves with things like smoking cigarettes or eating hot dogs. I think it's more than that. It seems to me that for an information age student the most defining characteristic of written text is that it is slow. Not quite as slow as listening to voice mail messages, but when compared to the rapid-fire pace of information transfer most of us are used to, it is achingly slow. The words struggle to pass from one to the next, a disappointingly linear presentation of what would more usefully be a multi-streamed layering and threading of information, context and content. Today's students see no reason to wait. If there is a lull in the information stream coming from one direction, they quickly shift focus to another.

The problem with text is that it can only do one thing at a time. As I compose this article, for

example, I would like to combine the multimedia version of Lawrence Lessig's [free_culture](#) with the recent study showing that there is a [generational gap](#), a gap so wide as to even include how the different groups [use their thumbs](#). With hyperlinking, I can at least fit these disparate thoughts into a single paragraph. With text only, it would be hopeless.

And yet it is important, in order to make the point, that these phenomena be seen side by side, acquired, ideally, in the same moment by the mind, so that the nuances of the one can be understood by the other. To see the depth of the generational gap I want readers to visualize the use of the thumb on keypads (as compared to the awkward way adults navigate the touch-tone with their index fingers) and to place that alongside the impact the spoken word adds to the slides in Lessig's show, to present all of these as a single thought.

What the critics of new media are missing is what may be called hyper-grammar. Textual language is bound by rules of syntax and semantics, with reference and meaning tightly constrained by systems of representation. It is not a thought, in text, if it cannot be articulated without a subject and a predicate. It is not related to another thought, in text, if it cannot be logically conjoined. Waves of meaning are washed aside when the experience is rendered into words. That experience, so quaintly called "filling in the gaps with your imagination" by the literati, is lamented by the older generation when it is lost. And frustrating for the young, who would like to know what the author really meant with just that turn of a phrase.

Today's reader works with a much wider grammar. Even such simply typographic conventions, such as the use of italics, bold and capitals, can add new meaning to a text. The addition of symbols, such as smileys, convey [emotion or sentiment](#). The breaking of linguistic rules - like this - can add urgency or clarity. The dropping of nouns, verbs or pronouns can express coreference (essentially, placing two separate thoughts into a single context). True, the haste with which people type online can result in a myriad of interesting typos and other errors - but then the error rate in a message also designates its degree of formality (conversely - to remove the errors reduces all text to the same sterile state of formality).

This is but one dimension of the new literacy. Here is another: go to any online chat room or IRC and observe the conversation. To the initiated, what emerges is a slew of seemingly unrelated comments. The participants roam back and forth from one topic to the next, sometimes within a single post. When I have hosted chats online among academic, participants complained that it was too complex, that they couldn't follow the conversation (and would I please ask people to stop posting messages). It would probably astonish such people that younger users may operate in several such chats simultaneously, each one in a separate window.

What should be understood is that these multiple threads layer into one another. It's not merely that attention is being shifted from one to another stream of information (though that does sometimes occur). Rather, the different topic streams are each facets of a multilayered presentation. The best analogy is in the explicit use of a soundtrack to add meaning to a dialogue (a technique used by the pop news shows so popular on television - as Homer Simpson says to his wife, "Oooo, he must be evil. Don't you hear the scary music?"). Words and images and text fuse into a single, complex message. Just as I can now no longer separate John Stuart Mill from the Devonian gardens (where I read *On Liberty*) or Quine's discussion of rabbits from the Edmonton river valley (where I read "Word and Object"), these multiple media add nuance to the text that words alone cannot convey.

So let us now return to the original complaint: that students are unable to understand complex

concepts. If it is true that students use hyper-grammar, that their attention is polyfocal, and that their interactions are multi-threaded, then it seems that even short exchanges are quite complex. The difference is in how that complexity is expressed. And it is arguable - and I would argue - that the sort of complexity sought after by the literati is an inferior complexity than that experienced by the information age student.

How so? In a famous passage Michael Polanyi in his book *Personal Knowledge* defined 'tacit knowledge' as being similar to knowing how to ride a bicycle. His point was that, no matter how much we read about the subject, it would be impossible to learn until we actually mounted the vehicle and took a ride for ourselves. Now in a certain sense, learning to ride a bicycle through practice is much simpler than the corresponding textual description. Indeed, it is likely that the person who has learned to ride the bicycle could not even understand the textual account of the same process (particularly if the mathematics of balance and motion are included). And yet, the person riding the bicycle has the very same knowledge as the person who has grasped the text - more, even, according to Polanyi.

What information technology brings us is the capacity to substitute experience for description. At the most basic level, we immerse ourselves in the darkness of a movie theatre and see and feel for ourselves what it must have been like to be on board the sinking Titanic. But add to this the possibility of multiple channels of communication, immersive simulation, multi-threaded interaction - a veritable medley of sight, sound and text - and we are able to move ourselves much closer to the experience, and thus to acquire a complex (though non-textual) comprehension of the event.

Moreover, the teen-age student may be in no better a position to describe this knowledge than a six year old who can ride a bicycle. Perhaps the only textual account he can give is a half-guttural "whoa." But this does not mean that the information has not been acquired. It merely means that the information has not been abstracted from its experiential surround, abstracted, stripped of emotion and rendered in neat little syntactically correct packages. Such a student would fail utterly in contemporary evaluations of learning (literary criticism being a foreign art form, an earlier and drier version of Siskel and Ebert). But this is more a criticism of the testing instrument: an evaluation of what the student really learned would be found in practice (does he avoid icebergs?) and creativity (can he emulate and improve upon the representation of ships being struck by icebergs?).

It may be years before people cease to lament the decline of the literate student (after all, people today still bemoan the fact that students no longer learn Latin and Greek). But lament it we should not, because by avoiding the need to codify knowledge into sentences and seminars students today are acquiring not only different modes of learning, but much more efficient and effective modes of memory and recall. The new literacy may not be an even greater grasp of the fine points of language, but rather, a capacity to move beyond the limits of text and to manipulate experience directly.

When I joined the National Research Council in the fall of 2001, one of my first projects was to ensure New Brunswick participation in the project that eventually became eduSource, an assignment I accepted enthusiastically because it dovetailed with my work in learning object distribution networks. As I began to advocate for a system of content distribution as described above, I found myself in need of a simple description of RSS in order to explain what I meant. This paper was thus written in advance of an eduSource Atlantic meeting for that very purpose.

An Introduction to RSS for Educational Designers

Written November 2, 2002. Unpublished.

RSS stands for “Rich Site Summary” and is a type of XML document used to share news headlines and other types of web content. Originally designed by Netscape to create content “channels” for its My Netscape pages, RSS has been adopted by news syndication services, weblogs, and other online information services.

Because it is one of the simplest uses of XML, RSS has become widely distributed. Content developers use RSS to create an XML description of their web site. The RSS file can include a logo, a site link, an input box, and multiple news items. Each news item consists of a URL, a title, and a summary.

Content developers make their RSS files available by placing them on their web server. In this way, RSS “aggregators” are able to read the RSS files and therefore to collect data about the website. These aggregators place the site information into a larger database and use this database to allow for structured searches of a large number of content providers.

Because the data is in XML, and not a display language like HTML, RSS information can be flowed into a large number of devices. In addition to being used to create news summary web pages, RSS can be fed into stand-alone news browsers or headline viewers, PDAs, cell phones, email ticklers and even voice updates.

The strength of RSS is its simplicity. It is exceptionally easy to syndicate website content using RSS. It is also very easy to use RSS headline feeds, either by viewing a news summary web page or by downloading one of many free headline viewers. Though most RSS feeds list web based resources, several feeds link to audio files, video files and other multimedia.

Why RSS is Important for Educational Designers

RSS is the first working example of an XML data network. As such, and in this world of learning objects and metadata files, RSS is the first working example of what such a network will look like for educational designers. Just as news resources are indexed and distributed in the RSS network, so also educational resources can be indexed and distributed in a similar learning object network.

The model provided by RSS is very different from the model provided today by learning content management systems (LCMSs). In the world of the LCMS, everything is contained in one very large software application. Insofar as content is distributed at all, it is distributed in bundled content libraries. This means that educational institutions must make a major investment in software and expertise in order to access learning content.

RSS, by contrast, is not centralized. It is distributed. Content is not distributed in bundles, it is distributed one item at a time. There is no central store, repository or library of RSS content; it is all over the internet. To access and use RSS content in a viewer or in a web page, you do not need a large software application. A simple RSS reader will do the trick.

For this reason, the distribution of educational content over the internet will look a lot more like an RSS network than it will an enterprise content management system. Many more people will use a distributed learning object network not only because it's easier and cheaper, but because they can access much more content for much less money.

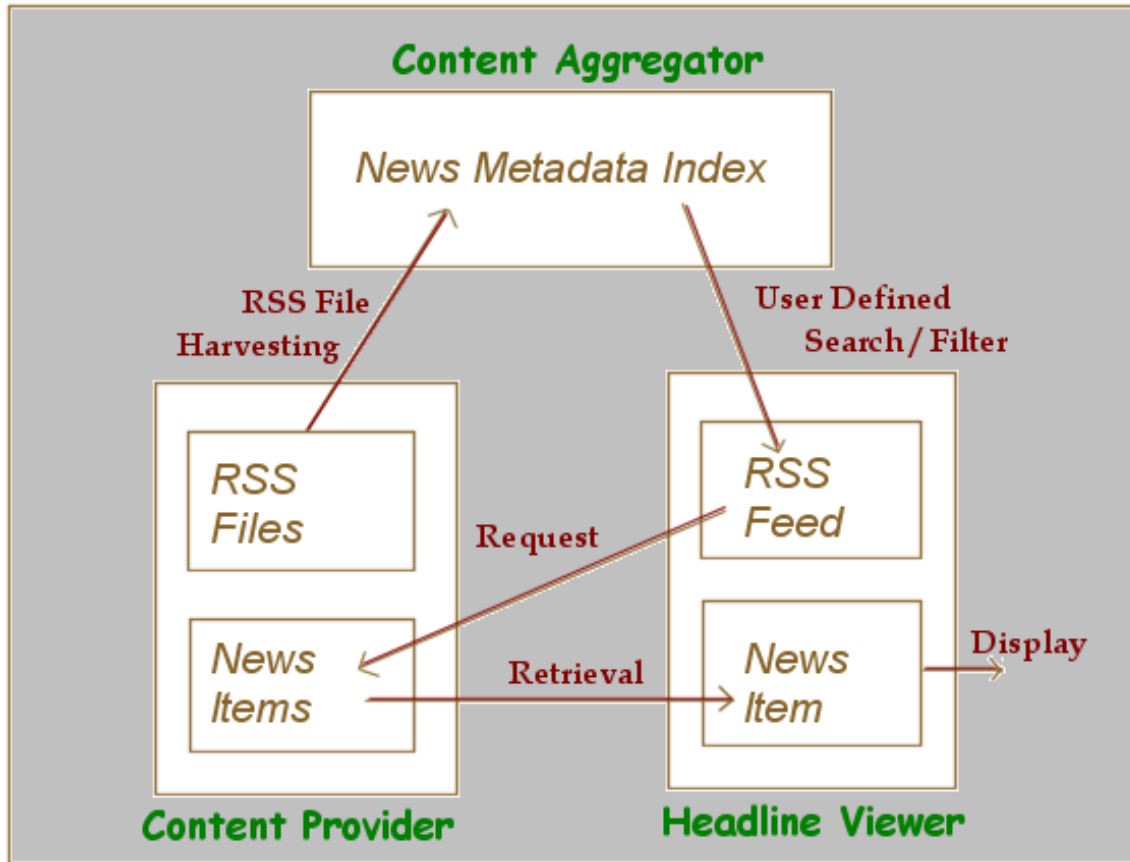
As a result, the concept of syndicated educational content can really come into play. While there will always be a need for reusable learning objects (RLOs), anything that can have an educational application – including images, videos, journal articles, even news items – can be distributed through a learning object syndication network.

The RSS Network Architecture

An RSS network consists of three major components:

- A (large) number of content providers, each providing news articles, and each providing their own RSS files describing these news articles.
- A (smaller) number of RSS aggregators that read these RSS files from multiple sources, collect them into an index, and provide customized “feeds” of topic-specific news headlines from this index.
- A (large) number of news viewing applications that, based on user input, connect to an RSS aggregator, access a news feed, and display it to the reader. On viewing the news feed, the reader can then select a news item (by clicking on the headline) and read the article directly from the content provider.

The RSS network architecture looks like this:



RSS Channels

A single RSS file is typically called an RSS channel. This is a lot like a television channel or a radio channel: it contains news items from a single source. For example, to the right is an HTML view of an RSS channel from the online magazine First Monday.

An RSS channel consists of two major sets of elements:

- Channel Properties – the name of the channel (in this case, First Monday), a home URL for the channel, and an image for the channel.
- Item Properties – the separate news items listed in the channel. In this case, there are ten news items listed. Each item has a headline and a URL. In some cases, an item will also contain a short summary, a publication date, author information, and more.

First Monday

The Lives and Death of Moore's Law
11/15/02 17:35

Reality Bytes: Cyberterrorism and Terrorist 'Use' of the Internet
11/15/02 17:35

Corporate Cyberstalking: An Invitation to Build Theory
11/15/02 17:34

The 'Digital Divide' Among Financially Disadvantaged Families in Australia
11/15/02 17:34

Exploring the Future of the Digital Divide through Ethnographic Futures Research
11/15/02 17:34

Examining the Determinants of Who is Hyperlinked to Whom: A Survey of Webmasters in Korea
11/15/02 17:34

Copyright Contradictions in Scholarly Publishing
11/15/02 17:34

By Choice or by Chance: How the Internet Is Used to Prepare for, Manage, and Share Information about Emergencies
11/15/02 17:34

Control of B2B E-Commerce and the Impact on Industry Structure
11/15/02 17:34

Book Reviews
11/15/02 17:34

Last Updated: 12/01/02 20:30

In order to define a channel like the one on the right, the channel properties and the item properties are defined in an XML file (or to be more precise, an RSS file), as follows:

```
<?xml version="1.0"?><rdf:RDF
xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns="http://my.netscape.com/rdf/simple/0.9">

  <channel>
    <title>First Monday</title>
    <link>http://www.firstmonday.com </link>
    <description>A weekly online magazine </description>
  </channel>

  <item>
    <title>The Lives and Deaths of Moore&apos;s Law</title>
    <link>http://www.firstmonday.com?sid=00/02/07/0243224</link>
  </item>

  <item>
    <title>Reality Bytes: Cyberterrorism and Terrorist &apos;Use&apos;
of the Internet</title>
    <link>http://www.firstmonday.com?sid=00/02/06/2155205</link>
  </item>

</rdf:RDF>
```

At the top of the text box is a declaration of the type of XML file being used. Next we see an XML field describing the RSS channel. Within this field is the channel name, link and description. Finally, we see a list of the items available in the channel (I have only listed two items here). Each item is described with a title, and a URL.

Creating an RSS Channel

Because an RSS channel is an XML file, it can be created using a plain text editor – the same sort of editor that you might use to create an HTML page. It is usually easier to start with a template (such as the RSS file displayed on the previous page) and to insert your own values for each tag.

Typically, though, RSS files are created automatically. This is possible because an RSS file has a standard format. Thus, if you have a database of articles, then you can easily create an RSS channel from that database by extracting table data into XML data.

Table1 : Table			
ID	Title	Link	Description
1	Some article ab	http://www.dogs	This article sum
2	Another article	http://www.more	And still this on
{AutoNumber}			


```

<?xml version="1.0"?><rdf:RDF
xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns="http://my.netscape.com/rdf/simple/0.9/">

<channel>
<title>First Monday</title>
<link>http://www.firstmonday.com </link>
<description>A weekly online magazine </description>
</channel>

<item>
<title>The Lives and Deaths of Moore&apos;s Law</title>
<link>http://www.firstmonday.com?sid=00/02/07/0243224</link>
</item>

```

Another popular means of creating an RSS file is by means of scraping an HTML file. To scrape an HTML file is to extract link titles and URLs from an ordinary web page. This is done by analyzing the HTML tags and for the link title and URL. A script such as this in Perl

```

While ($page_text =~ s/<a href="?!?">?!?</a>/g) {
    $url = $S1;
    $title = $S2;
}

```

will generate a list of the URLs and titles in almost any HTML page. Thus it is very easy to write a script that will generate an RSS file from any web page.

There are online services, such as Moreover, that specialize in HTML scraping. Moreover scans the web pages of major newspapers from around the world and generates RSS channels for them. Moreover also provides a series of specialized RSS feeds.

Weblogs

Weblogs, or as they are sometimes called, blogs, have a unique role in the world of RSS. A weblog is, in the first instance, a web page that is updated on a regular basis. Thus a weblog resembles a diary or a journal; entries are dated and each day the weblog web page contains something new.

What distinguishes a weblog from a personal web page, though, is that the weblog consists of a series of entries associated with links to other resources on the web. Thus the typical weblog consists of a list of sites, descriptions of those sites, and some discussion.

My daily newsletter, OLDaily, pictured at right, is a typical example of a weblog.

OLDaily has channel elements, such as the newsletter title and home page URL.

The difference is in the items. I am not listing my own articles. I am listing articles published by someone else. The description, however, is mine. I am providing my description and interpretation of someone else's material.

Also worth noting is that I did not obtain my items from a single source. As you can see by looking at the items, I have listed different articles by different authors working for different publications.

So a channel need not be produced by a content producer. A channel can be created by anybody with something to say about the items being described.

The RSS for OLDaily, though, looks exactly like the RSS created for First Monday. If you were to look at the RSS for OLDaily, though, you would find several more tags, and specifically, tags to denote the author, publisher and publication date of the article, along with the URL and the title.

Aggregators

An RSS aggregator is a type of software that periodically reads sets of RSS files and indexes them for display or syndication. There are two major types of aggregator: centralized and personal.

A centralized aggregator is intended for use by a number of people. RSS files are read by the centralized aggregator and are then used to create a topic-specific web page or customized RSS feeds (as in the diagram above).

The Moreover aggregator, for example, culls RSS from a variety of sources (including HTML pages, which it scrapes). It then provides RSS feeds devoted to specific topics – such as Microsoft, as illustrated - that can be used

Stephen's Web

[Home] [News] [Chat] [Discuss] [Search] [About]

OLDaily

By Stephen Downes
November 29, 2002

Evaluation Report of the Becta Digital Video Pilot Project When I was at AusWeb 01 I spent most of the conference working on a video project (I never did get my CD - if anyone out there has a copy of the video we created, please send it to me so I can share it with the list), making it one of my more interesting conference experiences. This report summarizes the results of similar exercises with similar technology that took place in 50 schools across the U.K. In sum, the use of video editing was found to increase pupil engagement with the curriculum, to promote and develop a range of learning styles, and to motivate and engage a wider range of pupils than traditional teaching methods. But digital video is no magic solution. It did not automatically improve the quality of work or standards of attainment. Teaching remains the key factor in raising achievement, but teachers need to be clear about their role in the process and what counts as creativity in digital video. By Mark Reid, Andrew Burn and David Parker, (British Educational Communications and Technology Agency, October, 2002 [[Refer](#)][[Research](#)][[Reflect](#)]

Collaborative Representations: Supporting Face to Face and Online Knowledge-building Discourse It took me a couple of attempts to get the gist of this article (which I attribute to the use of a two-column PDF format, terrible for screen reading). But the main idea is to explore how the visual representation of information and online collaboration can be combined into a single system. It's a good insight and the diagrams on the third or fourth page show clearly how interaction and visual representation need to be integrated. Many more papers by the same group are available [here](#). By Daniel D. Suthers, Proceedings of the 34th Hawai'i International Conference on the System Sciences , January, 2001 [[Refer](#)][[Research](#)][[Reflect](#)]

Linkages Between Secondary and Post-secondary Vocational Education and Training in China and Australia As the title suggests, this book length PDF compares vocational education in the two countries. Perhaps the most telling difference is that the system

Microsoft news headlines

Microsoft amends .Net Server licensing
CNET Dec 2 2002 7:41PM GMT [email this](#)

Rivals want Europe to hurt Microsoft
Infomatics Dec 2 2002 7:32PM GMT [email this](#)

Microsoft Remains Bullish At Downsized Comdex
Los Angeles Times reg Dec 2 2002 6:55PM GMT [email this](#)

Adobe Jumps Gun on Microsoft's Xdocs
Internet News Dec 2 2002 6:37PM GMT [email this](#)

Thought for the day: Open source versus Microsoft
CW360.com Dec 2 2002 6:31PM GMT [email this](#)

on web pages.

Another well known centralized aggregator is a web site called News Is Free. At latest report, the aggregator collects headlines from 3744 sources and allows readers to browse the headlines or to search for the latest news. The site also offers headline syndication and web services.

A personal aggregator is an application that runs on a user's desktop. It can access a centralized aggregator (in which case it functions as a headline viewer) or, more frequently, it can access an RSS channel directly. This is called subscribing to the RSS channel.

Radio Userland, for example, accesses a list of channels from a centralized aggregator. The user selects a set of channels from this list and subscribes to them. Radio then updates item listings from the selected channels once an hour. Using the data supplied from the RSS files, it also facilitates the creation of a personalized weblog (which can in turn be published as another RSS channel).

Another popular personal aggregator is called Amphetadesk. Like Radio Userland, users can select from a list of channels supplied by a centralized aggregator. Amphetadesk users can also subscribe to a channel directly if the channel provider has provided a specialized subscription script.

Aaron Swartz has written a novel aggregator that converts RSS channels into email messages.
Metadata Harvesting Generally

RSS aggregators are members of a wider class of software called harvesters. The purpose of a harvester is to retrieve and parse metadata located on remote servers, providing the information in a usable form for various applications.

In educational design, metadata harvesting involves the aggregation of metadata records associated with education and training resources. Aggregation provides greater exposure of those resources to the wider community. Aggregation also promotes the reuse of resources and encourages the development of interoperable resources.

The most well known metadata harvesting initiative in the education community is called the Open Archives Initiative (OAI). The purpose of the open archives initiative is to provide access to academic papers and other resources over the internet.

In the terminology employed by OAI, the content provider is called the data provider. The aggregator is called the service provider. And a harvester is a client application used by the service provider in order to access metadata from the data provider.

A number of initiatives have emerged based on the OAI harvesting protocols. The Public Knowledge Project, for example, is an initiative based at the University of British Columbia intended to develop an Open Journal System (OJS). The OJS assists with every stage of the refereed publishing process, from submissions through to online publication and indexing.

Another project is the Illinois OAI Protocol Metadata Harvesting Project. The public face of this project resembles a centralized aggregator in that it provides a search window for academic articles. It then displays the full metadata record for the selected article.

The National SMETE Distributed Library (NSDL) is another organization looking at metadata harvesting. The model described by NSDL mirrors almost exactly the model used by the RSS community. The NSDL project is attempting to collect metadata not only from OAI compliant archives but also from a wider variety of metadata sources. This, reports the NSDL, does not cause a problem not in the collection process but does cause a problem in service delivery.

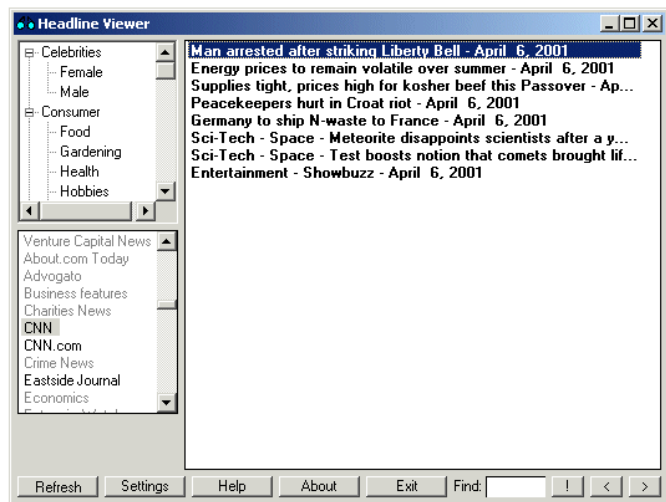
Headline Viewers

The purpose of a headline viewer is to provide a list of headlines obtained from an aggregator. When a user selects from this list of options (by clicking on a headline), the headline viewer retrieves the article from the source site and displays it for reading.

Many headline viewers exist. One of the earliest and best known is Carmen's Headline Viewer. This program runs as a stand-alone application on the desktop and taps into major centralized repositories such as My Userland, XMLTree, News Is Free and Grok Soup.

The major difference between a headline viewer and a personal aggregator (described above) is in the display of the results. Carmen's Headline Viewer, as can be seen from the screen shot at right, displays headlines sorted by topic. Thus the reader is not restricted to a small set of channel subscriptions; instead, they obtain topic-specific feeds.

Other headline viewers, such as Novobot, create web pages for viewing headlines. This has the advantage of being a familiar interface for most users. However, web pages listing many resources can take a while to load.



What RSS Does Not Provide

RSS is a powerful tool for content syndication. However, it lacks some important features needed to develop into a robust solution for the location and organization of educational content.

One of the major deficiencies (identified in the NSDL paper) is the lack of digital rights management for both original articles and metadata feeds. RSS assumes that all articles and metadata are published on the open web and are therefore freely available for viewing by anyone. This means that resources for which there is a fee cannot be accessed through the RSS network.

Another major problem, again identified in the NDSL report, is RSS's inability to deal with mixed metadata. Over the years various types of RSS have developed (RSS 0.9, RSS 1.0, RSS 2.0) and the tools have adapted on a case by case basis. RSS aggregators, however, still cannot access alternative forms of metadata, much less display resources from a wide array of both news and non-news sources.

A third problem for RSS is in the manner it handles weblogs. As described above, weblogs are commentaries on original resources. Yet they are displayed in the same format, and in the same place, as original articles. This can result in duplicate listings when the same resource is described in several weblogs. In addition, there is no means to display the comments from many weblogs side by side.

More Reading

Amphetadesk. <http://www.disobey.com/amphetadesk/>

Arms, William Y. et.al. October, 2002. A Case Study in MetadataHarvesting: the NSDL. <http://www.cs.cornell.edu/lagoze/papers/Arms-et-al-LibraryHiTech.pdf>

Carmen's Headline Viewer. <http://www.headlineviewer.com/>

Education Network Commonwealth of Australia. 2002. About Metadata Harvesting. <http://www.edna.edu.au/harvesting/module2.html>

Illinois OAI Protocol Metadata Harvesting Project. <http://oai.grainger.uiuc.edu/search>

Jackson, Dean. September 19, 2002. Aaron Swartz's RSS to Email Aggregator. <http://www.w3.org/2002/09/rss2email/>

Moreover. <http://www.moreover.com>

Novobot. <http://www.progggle.com/novobot/pdef.shtml>

News Is Free. <http://www.newsisfree.com>

Public Knowledge Project. University of British Columbia. <http://www.pkp.ubc.ca/ojs/>

Radio Userland. <http://radio.userland.com/>

Van de Sompel, Herbert, and Lagoze, Carl . June 14, 2002. The Open Archives Initiative Protocol for Metadata Harvesting. Version 2.0. Open Archives Initiative. <http://www.openarchives.org/OAI/openarchivesprotocol.html>

Winer, Dave. October 8, 2002. What is a News Aggregator. <http://davenet.userland.com/2002/10/08/whatIsANewsAggregator>

Though this paper was written before the next, it was written after (and in defense of) several of the pieces that comprise the next, leaving me with a chronological paradox. It is presented here in order to underscore some of the underlying thinking behind the next paper. The next paper is a detailed set of principles and architecture. This paper is the theory.

Componentization

Written on November 4, 2002. Published in [Learning Place](#), December, 2002.

Stephen Lanahas challenges my conception of a component-based learning object repository network. He writes,

"In a sense the terms "component" and distributed are holdovers from client-server architectures, they don't properly describe what is being done on the internet (even though the internet is effect the ultimate client server structure, it has more or less transcended itself). The closest things to describing what we're looking for is "web services" and "semantic web" but these seem inadequate as well (or else why we would the IT community be compelled to go back and drag out the componentization paradigm again).

"We are in a state of transition wherein the previous vision of how this would work, didn't work and the new visions have not really got off the ground. On a more practical note, one of the greatest failings with the "distributed" approach was its over emphasis on application issues, leading to extreme complexity.

"These factors have been conquered before, but only in strictly controlled environments (where performance was guaranteed, regulations in place etc.)

"The e-learning repository network will have to be a lower cost proposition by nature in order to succeed. The reason that peer to peer music succeeded was its architectural simplicity - simpler by a factor of 10x or more than what we're looking at.

"It's a very tough call, I still think we are a step or two away from a viable conceptual architecture for distributed repositories, I don't think those steps are big - just haven't recognized the breakthroughs yet..."

I think he raises serious issues. But they are issues with the potential for a good response.

It would be useful to obtain an analysis of why previous efforts at componentization (is that a word?) failed, and indeed why (and in what way) the internet is growing beyond itself.

From my perspective, the internet - and web - is itself the clearest example of the success of componentization.

Part of my thinking is derived from my imagining what the web would have looked liked had we taken the enterprise system approach. On such a model, in order to have web access, you would have to buy a large content management system, download 'the web' (or those components of the web to which you have licensed access), store it on your own system, and access it in-house.

Obviously, the web could not have been successful without the development of some very simple

components: a way of separating the browsing functionality from the web server functionality.

I agree that the cornerstone of componentization is simplicity. It is not clear to me that peer-to-peer as it has evolved has achieved that level of simplicity. The mess in instant messaging, for example, illustrates what can go wrong. That is why I advocate standards tolerance, and that is why I advocate a decentralized system - so you cannot have an AOL, say, denying access to the network by competing technologies.

I believe that simplicity is obtained by taking a lot of what is (was previously) believed to be network (or enterprise system, on the other view) properties and incorporating them into the objects themselves. Build complexity into learning objects, not the system that transports them.

For example, most (all?) LMSs and LCMSs have built in discussion board (or chat) tools. There is no reason for this. Access to a discussion list is a service, the functionality (or front-end) for which can be encoded into a learning object (perhaps not on the current definition of 'learning object' but I refuse to be dragged into such digressions).

Building too much functionality into the network itself - rather than into the objects transported into the network - is what leads to the creation of alternative competing networks, and a fragmentation of the system. It would be like building streaming media into the definition of the HTTP protocol - then we would have a web that is compatible for MS media Player users and a completely different web for Real Networks users.

But by building functionality into a subsystem that can be transported over the network (aka plugins) this sort of fragmentation can be avoided. Oh sure, you still have compatibility issues (I have *never* made Quicktime work properly, for example), but at least the network as a whole isn't broken.

Semantic web, web service - yes. These are names for it, implementations of the concept. They haven't really taken off because we lack the simple components that allow people to use them productively. There is no 'web services browser' - nor would one make sense, under the current implementation. There is no 'semantic web' browser (Amaya notwithstanding).

That's why we need a simple tool for e-learning access, a simple API or protocol that can be easily adapted by developers, that provides people with a view of the entire learning object sphere. Until such a thing exists, the whole field of learning objects dies stillborn, a great idea that nobody could use.

But you don't get a simple browser without componentization. Which, since I think learning objects really are a good idea, is why we need componentization.

My own personal view (and of course there remains every possibility that I may be wrong) is that the breakthroughs we need are in this description:

- multiple instances of essential components, to avoid bottlenecks
- standards tolerance, to ensure interoperability
- smart learning objects, to ensure simplicity
- browsing tools, to ensure usability

The rest of it, the layers of third party metadata, of DRM, of personal information systems, etc., are to enable increased functionality. They are layered onto the basic system, much in the way images and later streaming media were layered onto the web.

Anyhow, that's my view. That's how I see the infrastructure unfolding. And I would be very surprised to see it unfold a substantially different way, at least over the long term.

Through the summer of 2002 I wrote a series of short papers (many of which ended up in Learning Place) in an effort to sway the eduSource project to my way of thinking. Then, in the fall of 2002, I was invited to speak in Milan, and so in desperate need of something to talk about I strung the papers together, added some bridging material, and produced what was probably my most important work of the year. It was not enthusiastically adopted by eduSource, as I had hoped, but it did receive some readership and acclaim. Oh, and it was very well received in Milan. The second part of the title only appeared in its published form; I would never have added the question mark.

Design and Reusability of Learning Objects in an Academic Context: A New Economy of Education?

Written October 9, 2002. Published in [USDLA Journal](#), January 7, 2003.

Introduction

The purpose of this paper is not to discuss the creation and use of learning objects per se but rather to look at systems for locating and distributing learning objects. What will be argued is that this system is currently poorly constructed, based essentially on what may be called a silo model of distribution. A series of problems and issues related to this model will be discussed. In place of the silo model, a distributed model of learning object repositories is proposed. This model is based on a set of principles intended to create an open and accessible marketplace for learning objects, in essence, a learning object economy. To conclude, a model for a distributed learning object repository network is proposed.

For readers unfamiliar with the concept of learning objects, the generally accepted definition is that learning objects “any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning.” (IEEE, 2002) Wiley (2000) defines a learning object as “any digital resource that can be reused to support learning.” Even so, as Wiley comments, “the definition is broad enough to include the estimated 15 terabytes of information available on the publicly accessible Internet.” In this paper, a functional definition of learning objects is employed: a learning object is anything that is exchanged in what may be called the learning object economy.

The State of the Art

Overview

In this section common methods for locating and retrieving learning objects will be discussed. In particular, three major systems will be described: course portals, course packs, and learning object repositories. In addition, systems for collecting and organizing learning objects, learning management content systems, will also be described.

Course Portals

A course portal is a website offered wither by a consortium of educational institutions or a private company working with educational partners that lists courses from a number of institutions. The

purpose of a course portal is to enable a student to browse through or search course listings to simplify the student's selection of an online course. The following are examples of course portals.

TeleEducation. A New Brunswick, Canada, learning organization, TeleEducation NB hosts the TeleCampus Online Course Directory. Courses are submitted by institutions and screened to ensure that they are fully online. The database contains more than 50,000 courses, including about 3,000 free courses and 1,200 complete and fully online programs. TeleCampus provides a subject-based directory and search services. <http://teleeducation.nb.ca/>

UNext. Focusing on business education, UNext collaborates with major business schools such as the Columbia Business School, Stanford University and the London School of economics to provide courses in leadership and management, e-commerce, marketing, finance, accounting, and business communications through the private and for-profit institution, Cardean University. <http://www.unext.com>

Hungry Minds. Hungry minds offers more than 17,000 courses through its online campus, Hungry Minds University, from course providers such as the University of California at Berkeley, the University of California at Los Angeles and New York University. Hungry Minds also provides learning content through publishers such as For Dummies, CliffsNotes, and Frommer's. <http://www.hungryminds.com/>

Fathom. Created by Columbia University and including partners such as the University of Chicago, the London School of Economics and Political Science, Cambridge University Press, The British Library, The Smithsonian Institution's National Museum of Natural History, and The New York Public Library, Fathom is a centralized for-profit learning object repository. While Fathom provides lectures, interviews, articles, performances and exhibits, its major focus is an offering of online courses from member institutions. <http://www.fathom.com> (You, 2001)

Course Packs

Course packs are packages of learning materials collected to support a course. Offered primarily by educational publishers, course packs are collections of learning materials offered to instructors for use in traditional or online courses. The course pack may be pre-defined or custom built by the instructor. The instructor is expected to supplement the course pack with additional content, educational activities, testing and other classroom activities.

Some course packs, such as those offered by XamEdu, are stand-alone. This means that the course pack is distributed as a separate product and purchased by the student directly through the college or university bookstore. Supplementary educational materials are offered by the instructor on his or her course website or are delivered in a classroom setting. Other course packs are available for use only in a learning management system (LMS). Course packs delivered through a learning management system are more like 'default' online courses. Using tools provided in the LMS, the instructor selects the course and customizes it for delivery online.

The following are examples of course pack providers:

WebCT Course Packs. The learning management system WebCT offers course packs consisting of a course structure and set of readings offered by publishers with a distribution agreement with WebCT. Course packs are purchased by the institution on a seat-license basis and are then customized by the instructor.

Canada's SchoolNet. In Canada, the leading learning resources portal is probably Canada's SchoolNet. A list of resources is displayed, each with a short description and a link to an external website. SchoolNet also provides information about each site and provides an "advanced search" using metadata. Each resource in the "curriculum" area is approved by a professional "pagemaster". For the most part, however, SchoolNet links to institutional home pages, and not to learning resources per se. Teachers using the SchoolNet service must still search through these sites in order to locate suitable materials. <http://www.schoolnet.ca/>

MarcoPolo. MarcoPolo is a compilation of teaching resources from six educational institutions which provide free internet content for K-12 education. What the six partners have in common, and what makes this an important and interesting development in online learning, is an adherence to national curriculum and evaluation standards in the subject areas. Material is categorized by grade level and individual items are matched to individual learning topics. Despite its strengths, however, MarcoPolo is a closed project; only the six member institutions contribute content. There is no centralized search facility and no metadata listings for the resources. <http://marcopolo.worldcom.com/>

XanEdu. XanEdu is a learning resource site that collects articles from journals, magazines and other resource providers. Instructors may compile 'course packs' consisting of collections of these materials; students who subscribe to XanEdu may access these course packs. The materials are sorted by category and may also be located using a search mechanism. Like MarcoPolo, however, XanEdu is a closed project. It draws materials only from selected publishers. And while it allows subscribed students to browse through its materials, the vast bulk of resources available on the internet cannot be found through XanEdu. <http://www.xanedu.com/>

Learning Object Repositories

Learning objects are stored in databases called learning object repositories. There are two major types of repositories: those containing both the learning objects and learning object metadata, and those containing metadata only. In the latter case, the learning objects themselves are located at a remote location and the repository is used as a tool to locate learning objects. In the former, the repository may be used to both locate and deliver the learning object.

Most learning object repositories are stand-alone. That is, these repositories function a lot like portals in that they contain a web-based user interface, a search mechanism, and a category listing. Another major class of learning object repositories functions more like a database attached to another product. An LCMS, for example, may contain a learning object repository intended for its exclusive use.

Two major models for learning object repositories exist. The most common form is a centralized form in which the learning object metadata is located on a single server or website (the learning objects themselves may be located somewhere else). An alternative model is the distributed learning object, in which the learning object metadata is contained in a number of connected servers or websites. Distributed learning object repositories typically employ a peer-to-peer architecture to allow any number of servers or websites to communicate with each other.

The following are examples of some learning object repositories:

Merlot. Described above, Merlot is probably the most well known learning object repository. Merlot is a centralized repository containing metadata only and pointing to objects located at

remote locations. It is stand-alone, acting like a portal for learning objects. In addition to providing search and categorization, Merlot provides a peer review service provided by communities of experts in different subject areas. <http://www.merlot.org>

Campus Alberta Repository of Educational Objects. CAREO is a centralized collection of learning objects intended for educators in Alberta, Canada. A stand-alone repository, CAREO contains metadata and provides access to learning objects located on remote web servers. <http://www.careo.org>

Portals for Online Objects in Learning. POOL is a distributed (peer-to-peer) repository system under development intended to create a pan-Canadian repository of learning objects. A primary objective of POOL is to develop and distribute tools for creating connected learning object repositories. <http://www.newmic.com/pool/> (not currently functioning). See also <http://www.canarie.ca/funding/learning/1999backgrounders/pool.html>

National SMETE Distributed Library. In development for the (SMETE), NDSL is intended as a “federation” of learning object repositories, each library using different document formats, different systems of classification, and different database and repository management schemes. NDSL is intended to join these libraries using a common search engine called Emerge and a method for sharing resources called LOVE (Learning Object Virtual Exchange). (Chen, 2001)

Learning Content Management Systems

Learning objects are typically small, consisting of no more than the equivalent of an hour or two of instructional time (there is some debate as to how small a learning object may be and whether educational content must contain pedagogical features, such as a statement of learning objectives, in order to qualify as a learning object). Most educational institutions deliver larger chunks of instruction, called courses. To create a course, therefore, a set of learning objects must be assembled into a package.

Packages organize learning objects sequentially. In order to create a course out of, say, a dozen lessons, where each lesson is a separate learning object, a course author arranges these lessons into a sequence. In some cases, where the learning objects are smaller units, course designers may need to create lessons composed of a sequence of individual modules, then the course as a whole out of the sequence of lessons. However created, the sequence of objects is used to define course-specific entities as the course outline or table of contents.

Packages are created using a Learning Content Management System. While a course author could locate and assemble learning objects by hand, it would be tedious and unproductive to do so. Courses created using learning objects are typically created using a development environment called a Learning Content Management System (LCMS). The LCMS performs two major functions: it provides authors with a means of locating learning objects, and it assembles them into standards compliant learning packages (or courses). (Ellis, 2001)

Though many types of LCMS are available, the typical LCMS will contain four essential features: an authoring application similar to the computer assisted software environment (CASE) described above, a collection of learning objects (called a repository), a means of sending the completed course to a delivery system (called a delivery interface), and administration tools.

<http://www.internetttime.com/itimegroup/lcms/IDCLCMSWhitePaper.pdf>

<http://www.internetttime.com/itimegroup/lcms/>

Using an LCMS, a course author defines major features of the course: its topic area, say, or its grade level. The author then instructs the LCMS to search through the learning object repository for relevant resources (because the data is in XML, the search can be very precise). From the search results, the author may review a learning object or select it for inclusion in the course. The LCMS retrieves the object metadata from the repository and inserts it into the course package. The LCMS automatically adds institution-specific formatting and prepares the package for delivery.

Problems and Issues

Overview

In general the issues surrounding the location, distribution and reuse of learning resources online have to do with system architecture and resource based on what I call the “silo model.” On the silo model, resources are not designed or intended for wide distribution. Rather, they are located in a particular location, or a particular format, are intended for one sort of use only.

The silo model is dysfunctional because it prevents, in some essential way, the location and sharing of learning resources. In an important sense, such resources or architectures are broken because they require some additional step, usually involving manual labour, in order for developers or learners to make use of the material. The requirement of such a step adds significantly to the cost of a learning resource and in some case may prohibit its use altogether. In fairness, this cost or prohibition may be imposed by design. But from the point of view of a learning object economy, the resource or architecture is unusable.

There are numerous ways a learning resource or architecture may follow the silo model. In this section, a number of these are listed. Few products embody all of these problems. But most contain instances of at least one of these problems. And even a single instance of the silo model is enough to prevent a learning resource or architecture from being used as part of a network.

Proprietary Standards

A standard is proprietary when it is secret or when patents, copyrights or other restrictions prohibit its use. The standard is created by a commercial entity and specifies “equipment, practices, or operations unique to that commercial entity.” (National Communications System, 1996) With the advent of the internet, proprietary standards are much less of an issue than in years past. Nonetheless, proprietary standards continue to abound, especially in the realm of multimedia formats.

The use of a proprietary standard divides a distribution network into those people or systems able to use the standard, and those people or systems unable to use the standard. For example, a document created using DXF for Autocad may not display properly in Cadkey, which uses CADL, or ACIS, which uses SAT. Another example is XrML, a digital rights management language developed by ContentGuard. Developers have been reluctant to use the standard because of Microsoft’s control over the standard. (DRM Watch, 2002)

Proprietary standards pose numerous risks to developers. One risk is that the standard will cease

to be supported in new software. Documents encoded in older MS Word formats, for example, need to be converted before they can be used. There is the risk that licensing terms may change, and as a consequence, require that user pay unexpected licensing fees. If the standard is not widely shared or distributed, as is the case, for example, with Microsoft Windows, it is difficult to develop new applications, and the holder of the standard enjoys an advantage over competing products. Additionally, the choice of viewing software may be limited. Because of these risks, it is difficult to encourage wide adoption of proprietary standards.

Several of the systems listed in the previous section depend in whole or in part on proprietary standards. Course packs designed for Web CT, for example, cannot easily be used in competing learning management systems. It is necessary to use a content migration utility (some versions of which are no longer supported) to obtain interoperability. <http://www.webct.com/IMS>

Overly Strict Standards

Even when a standard is non-proprietary, it may be the case that the standard is too limiting for widespread use. If, for example, a standard requires that only a limited type of data will be transported by a data transmission system, then novel applications using different types of data will be impossible to develop.

Much of the criticism around the Sharable Content Object Reference Model (SCORM) was focused on this sort of objection. SCORM was developed to support self-study modules designed for use by the U.S. Military. Learning objects defined using SCORM are mutually independent, meaning that only the most basic sort of sequencing is enabled. This has led critics to suggest that SCORM is not flexible enough to allow for a variety of pedagogies. (Welsch, 2002)

In a similar manner, transport protocols may also be too strict. Just as, for example, a road is much less strict (and therefore much more widely used) than a railroad, so also a distribution network that delivers only learning objects (and not, say, journal articles) is less likely to be used than a network that delivers both.

Some of the systems described in the previous section adhere to standards that are too strict. Any system requiring SCORM compliance, for example, will be viewed in this way. So also will repositories that list learning objects only, such as Merlot.

Standards may be unreasonably strict in other ways. The GNU General Public License (GPL), for example, requires that any product developed using GPL software must also be GPL. Since the GPL is intended “to make sure the software is free,” all modifications of GPL software must also be free. (GPL, 1991) While the purpose of this condition is to ensure that developers cannot convert a GPL application into a proprietary application, the interpretation is that GPL prohibits the development of any proprietary applications within a given application environment. (Microsoft, 2002)

Another issue related to the strictness of standards is the complexity of the standard in question. If the standard is too complex, use of the standard requires an involved process or development tool. Legacy content, which might have met a laxer standard, must be converted to the new standard. XrML has been criticized because of its complexity (DRM Watch, 2002) as has SCORM (Welsch, 2002).

Monolithic Solutions

Under the name of “enterprise solutions,” learning content management systems have become tightly integrated monolithic software bundles. Such integration is even touted as a benefit by many software companies. Saba Software, for example, promises to “replaces today’s ad hoc processes and disparate systems with a single system and a unified view of everything your organization needs...” (Saba Software, 2002)

Purchasers of such systems are as a consequence committed to a single solution for all aspects of learning management. If, for example, you don’t like the discussion board or quiz generation tool in WebCT, perhaps finding it too complicated to manage (Shelangoske, 2002), there are no alternatives; third-party products cannot be simply ‘plugged-in’ to replace the WebCT default installation.

The purchase of such a system additionally requires paying for much more than may be desired. Because an essential component of learning content management systems is a database of learning objects (Nichani, 2001) a purchaser is committed to buying hardware and software support (for example, a database system such as Oracle) that may be well beyond their needs. In a tightly integrated system there is no means to deploy third-party or hosted services to manage part or all of the database; it must be located in-house.

Closed Marketplace

A closed marketplace exists when an owner of a learning content management system has only a limited selection of content to choose from. This limitation occurs when the LCMS vendor reaches an exclusive agreement with a content publisher to distribute materials. Such agreements formed the bulk of press announcements through 2001 and 2002.

One of the major distributors establishing priority in learning management systems, XanEdu has reached distribution agreements with a number of vendors, including Blackboard, Fathom, Microsoft, America Online, and Gallileus.

Such agreements make it more difficult for purchasers of competing systems to obtain access to XanEdu’s exclusive library. In such cases, each student must obtain a separate XanEdu account, providing credit information and paying XanEdu directly. Similar restrictions prohibit direct access to a wide variety of published content produced by other vendors.

And such agreements make it more difficult for content publishers to sell to users. Unless affiliated with a publisher (and consequently willing to accept publishers’ terms and conditions), content providers are unable to make their material available for selection by LCMS users. Because LCMS content selections are offered as a bundle, often from LCMS vendors, content providers not selected to become part of this bundle are excluded from selection.

The consequence of such a Byzantine marketplace is that established publishers with large content libraries are favoured. Because of the overhead involved, and because established publishers are wary of the competition, free content is discouraged and generally unavailable. This has the consequence of increased prices for content consumers.

The combination of monolithic systems and closed marketplaces tends to favour large educational institutions over smaller colleges and independent study. If it is necessary to purchase a large

LCMS and pay premium prices for educational content, a smaller institution with fewer students cannot compete with institutions with enough students to distribute the cost. Independent study in such an environment is increasingly difficult, with most choices for potential students difficult to find or simply unavailable.

Disintermediation

A system is disintermediated when there is no form of assessment or review guiding the selection of learning resources. The purchaser's only guide to the quality of learning material, in such a system, is obtained directly from the vendor. In a disintermediated system, there is no independent third party available to filter selection, assess or certify materials, or to comment on their potential use.

The contrary to disintermediation is intermediation. Some systems, such as merlot, attempt to provide a rudimentary form of intermediation through the provision of peer reviews of educational materials. Merlot's system, however, is closed in the sense that only a select group of people may provide reviews. And it is limited in the sense that reviewers evaluate only materials found in Merlot.

The need for some form of intermediation is evident from the numerous ad hoc mechanisms already in place. Such systems are typically institution-specific and involve the use of proprietary forms and assessment criteria. The system provided by dlnet, for example, provides a specific set of criteria and a review form. It is used only by reviewers rating material for inclusion in the Digital Library Network for Engineering and Technology. (dlnet, 2002)

Similar systems are employed by the Peer Review of Instructional Technology Innovation (PRTI) program in the Broadband Enabled Lifelong Learning Environment (BELLE) project and the Development of a European Service for Information on Research and Education (DESIRE) project. (Place, 2000) In both cases, the purpose of the review is to establish a scope and selection criteria for the repository.

Systems where a review process is intended to select materials for inclusion in a specific repository may be described as "gate-keeping" services. Such services are undesirable for several reasons. First, they create significant overhead by requiring that each item be reviewed manually, causing a backlog in the addition of materials to the repository. Moreover, the results of the review are unavailable to third parties; the reviews are available only to users of a specific repository. Moreover, there is no means in such a system for third party or dissenting reviews.

In the case of many other systems, there is no review mechanism available at all. A purchaser of online articles or journal publications from a subscription service has only the article abstract available to guide selection. The reader must pay the access cost in order to determine that the abstract is misleading or that the content is not relevant.

Selective Semantics

Though progress has been made recently (with, for example, the IMS Re-useable Definition of Competency or Educational Objective (RDCEO) (Kraan, 2002)), there is a tendency to view the network of learning objects and repositories as a stand-alone service on the world wide web, not integrated with or compatible with many other resources and services available.

This is an issue mostly of perception rather than implementation. It results from the presumption that an application profile, such as SCORM, is a standard, and thereby the presumption that SCORM sets out the one and only way to describe learning objects. This has been the basis for much discussion, including heated exchanges surrounding the idea that “SCORM is for everyone.” (Rehak, 2002) In fact, many application profiles, even in the educational arena, exist. (Friesen, 2002)

In fact, SCORM is an application profile, which in turn are “schemas which consist of data elements drawn from one or more namespaces, combined together by implementors, and optimised for a particular local application.” (Heery and Patel, 2000) Understood as such, it is therefore unreasonable to expect that any given application profile, even SCORM, would be widely used in multiple contexts.

The issue of selective semantics arises when a network application, such as a network of learning object repositories, standardizes on a given application profile. Such specialization restricts the usefulness of such a network to the application envisioned by the designers of the application profile, and thus precludes different (even closely related) applications. A repository network, for example, that standardized on SCORM would preclude from consideration resources which are useful to course designers, such as journal articles, but which may not be described as learning objects per se.

Though it is not possible to find a network designed along such principles, there is no shortage of learning content systems proclaiming themselves to be “SCORM compliant.” Viewed in this light, unless such systems are designed to manipulate RDF data, rather than only SCORM data, such systems are announcing merely that they are not suitable for a wide array of applications (though they may be ideal for environments envisioned by the designers of SCORM).

Digital Rights Mismanagement

The issues related to digital rights management (DRM) are legion and need not be reviewed at length here. That said, since DRM will be an essential component of any network of learning object repositories, it is necessary to survey some of the major issues.

The first and probably the most significant concern is that no simple DRM solution has been widely implemented. This is because in many implementations, digital rights management has been conflated with the idea of digital rights enforcement. Thus, for example, the first widespread of proprietary electronic content required the use of specialized devices, known generically as eBooks.

Though eBooks satisfied the need to enforce digital rights, they were generally considered a failure because they required the purchase of specialized hardware and could not interoperate with anything else. As Hillesund (2001) notes, “Today there are two factors working against eBooks and hindering diffusion. These factors include the overall poor quality and high prices of reading devices and the lack of proper and interoperable digital rights management (DRM) systems.” Insisting on physical control of digital materials stymies the exchange of these materials. (Lyon, 2001)

The state of digital rights management for web based resources is not much better. In order to access content, it is typically necessary to negotiate access with each separate supplier. A person dedicated to purchasing online content, for example, may have to obtain separate accounts with

Corbis (an image service; <http://www.corbis.com/>), Lexis-Nexus (a clipping service; <http://www.lexis-nexis.com/>), Salon (a magazine; <http://www.salon.com>), and so on and on. In many cases – the most notable being the online distribution of music – there is no means to obtain access to a full catalog of material.

The use of clearing houses that characterized first generation digital rights management is insufficient for the wide variety of materials and business models desired in online content exchanges. No trusted fiduciary agent, as described by Lyons (2001), exists to facilitate the exchange of learning resources. Consequently, a fractured and distrusting system of credit-card deposits, proxy servers and disabled file formats has emerged. This has resulted in content that is difficult and expensive to obtain and impractical to use.

Design Principles

Overview

These design principles are intended to govern the development of an architecture for a distributed learning object repository network (DLORN). The purpose of the principles is to guide the description of the components employed, the standards followed, and the principles governing the operation of the network.

These principles are in one sense descriptive and in another sense prescriptive. They are descriptive in the sense that they attempt to capture the essential elements of what is likely to be the most successful system for the distribution and use of learning materials on the internet. They are prescriptive in the sense that they are intended to inform the development of such a network.

Open Standards

The protocols used by components of the components of DLORN to communicate with each other and with external systems are described, documented, and freely available to the public at large. The purpose of this principle is to encourage the development of complimentary systems that may interact with and support the functionality of DLORN.

For example, a DLORN should embody interoperability with other networks and systems that are being developed by libraries and museums worldwide. In other words, the DLORN is not a network with own proprietary communication protocols open to only repositories within system but can operate with others outside systems such as the Open Knowledge Initiative (OKI; <http://web.mit.edu/oki/>) and to be aware of other communications protocols, such as Z 3950 (Miller, 1999), to augment its own information objects with those from other collections.

Royalty-free Standards

The standards developed or used by DLORN shall be royalty-free. The purpose of this standard is to ensure that there is no a priori overhead cost incurred by agencies wishing to offer services compatible with DLORN. Imposing an a priori cost immediately poses a barrier to small and medium sized enterprises that may wish to participate and it biases the network toward the provision of commercial content only.

Enable, Don't Require

Where possible, DLORN will not require adherence to a particular constraint, but rather, will allow users of the system to exercise options among various models. The design of the system will be to allow systems that exercise different options to interoperate and to work within the same space.

This principle is essentially based on the idea of defining different levels of compliance required for interoperability within the network as a whole than would be required by specific instances of the system. At the network level, a minimal standard is desired in order to achieve the widest functionality possible. One way of stating this is to require interoperability at the syntactical level only, without stipulating as to the content being exchanged.

This need must be balanced against the need for a more robust interoperability, one that requires a common understanding of meaning as well as sentence structure. Although interoperability is possible, if the agreement consists of syntactic structures only, such interactions are functionally meaningless. Greater agreement is desired, and the greater the level of semantic agreement within two systems, the greater the interoperability.

In practice, what this means is that although the network as a whole imposes no prior semantic restrictions, in order to use the network it is necessary that some semantical agreement is required for two instances to interoperate within this framework. In other words, though the network imposes no restrictions on how something is described, evaluated, valued, or transacted, entities within the network must define how these are to be described. [1]

Open-Source Infrastructure Layer

The infrastructure layer is the set of components that provides end-to-end functionality for DLORN. It is described in the paper Distributed Learning Object Repository Network Infrastructure Layer (forthcoming). The set of components in the infrastructure layer will be developed and distributed as royalty-free open source software. The purpose of this principle is to demonstrate functionality without requiring financial advances, and to provide a base of functional components on which other services and applications may be developed.

Open or Proprietary Service Layer

Over and above the infrastructure layer it is hoped and anticipated that third parties will develop components with increased functionality, offering an improvement in design or services over and above the functionality provided by the infrastructure layer. Such components may be developed as free and open applications, or they may embody commercial and proprietary components. The purpose of this principle is to enable the development of commercial applications that generate a revenue stream for software developers and service providers.

Component Based Architecture

The DLORN is to be designed not as a single software application, but rather, as a set of related components, each of which fulfills a specific function in the network as a whole. This enables users of the DLORN to employ only those parts of DLORN that suit their need, without requiring that they invest in the entire system. It also allows for distributed functionality; a user of DLORN may rely on a third party to provide services to users. The purpose of this principle is to allow for

specialization. Additionally, it allows users of DLORN to exercise choice in any of a variety of models and configurations.

Distributed Architecture

Any given component of DLORN may be replicated and offered as an independent service. Thus, it is anticipated that there will be multiple instances of each component of the DLORN infrastructure. The purpose of this principle is to provide robustness. Additionally, it is to ensure that no single service provider or software developer may exercise control over the network by creating a bottleneck through which all activities must pass.

Open Access

Any provider of learning materials may prepare and distribute learning materials through DLORN. Though DLORN will support the registration and indexing of various providers, this registration will be free and optional. The purpose of this principle is to ensure that providers are not faced with a priori 'membership fees' or similar tariffs in order to gain access to potential purchasers. This does not preclude restrictions, tariffs or controls on specific instances of a DLORN component. However, in any case where a restricted component, such as a for-profit metadata repository, exists, an equivalent unrestricted component, such as a public metadata repository, will also exist.

Open Market

There will be no prior restraint imposed on the distribution model selected by participants in DLORN. Specifically, DLORN will accommodate free content distribution, co-op or shared content distribution, and commercial fee-based content distribution. The purpose of this principle is to ensure fair and open competition between different types of business models, to ensure that users of DLORN are not 'locked in' to the offerings provided by certain vendors, to provide the widest possible range of content options, and to ensure that prices charged for learning content most accurately reflect the true market value of that content.

Standards Tolerance

DLORN imposes no prior restraint on the metadata standards used by participants to describe given resources or services. Metadata repositories are tolerant of different standards employed by different providers of learning materials. Metadata repositories also (attempt to) provide output in the standard requested by users of the system. This means, for example, that a vendor may elect to employ IEEE-LOM to describe its learning materials, while a consumer may request information in the form of the CanCore profile. Standards tolerance extends to the description of digital rights, classification and taxonomies, and evaluation and annotation. The purpose of this principle is to enable an inclusive marketplace, to reduce risk by vendors when metadata standards are selected, and to enable the development of vendor-specific or custom metadata for particular uses.

Multiple Channels

The description of DLORN will include descriptions for communication using multiple channels or multiple modes of communication. For example, DLORN will enable requests using web services such as XML-RPC or SOAP, gateway interfaces such as HTTP-POST, and harvesting

protocols such as OAI. The purpose of this provision is to enable redundancy in the system. It is also to reduce the liability of the network should any given standard become a royalty-based standard. It is also to provide software developers the greatest range of options for the creation of new services.

Multi-Party Metadata

Multiple parties may provide metadata describing a given learning resource. There is no prior restraint exercised by providers of learning materials on evaluations, appraisals, comments and other fair descriptions of their learning material. The purpose of third party metadata may be to provide alternative classification schemes, to indicate certification compliance, or to provide independent assessments and evaluations of learning resources. The purpose of this principle is to ensure that potential users of learning resources to obtain neutral descriptions of that material. It is also to create an environment for the creation of optional but value-added third party services for which fees or other costs may be charged.

Integration with the Semantic Web

DLORN should be considered as an implementation of and an extension of the semantic web. This means that DLORN metadata data and services would be available to the semantic web as a whole. It also means that DLORN can and should incorporate elements of the semantic web, such as sector-specific ontologies, into its own design. The purpose of this principle is to ensure that DLORN is capable of the widest reach possible. It is also to reduce the duplication of effort between developers working in specific domains and educators working in the same domain.

Multiple Data Types

No prior restrictions are imposed on the data types to be transported through DLORN. This includes but is not restricted to various content formats, proprietary or otherwise, such as HTML, and the like. This provision is also intended to allow learning resources that are not learning objects, as variously defined, to circulate through the system. For example, academic papers distributed through the Open Archives Initiative, news articles distributed through various vendors, conference, class or seminar registration and information may also be distributed through DLORN. The purpose of this proposal is to enable any learning resource, including in-person learning services, to be accessed, and not merely a specific subset of learning resources.

Simple Digital Rights Management (DRM)

The principle behind fee-based and subscription-based transactions is that it should be easier to buy material than to steal it. Thus where possible, the acquisition of rights and the exchange of funds will be automated. The purpose of this principle is to reduce transaction and clearance costs for purchasers of learning materials.

Brokered DRM

Transactions within DLORN are brokered. That is, typically, a given provider of learning materials will work with a single agent who sells to multiple purchasers, and a given user will work with a single agent who conducts transactions with multiple vendors. Vendors and users may select from any number of brokering services, so that no single transaction agent controls the network. Vendors and purchasers may act as their own agents. A vendor or purchaser may elect

to employ multiple agents. Agencies acting on behalf of, say, a provincial department of education, may act as agents for a given populations, such as the students of that province. The purpose of this provision is to eliminate the need for the creation of multiple accounts, to allow users to user resources from multiple vendors, and to provide a choice of agents, and therefore a greater likelihood of trust.

Permission Based

This principle states in effect that users of the system own their own personal data. The user's agent operates on behalf of the user, and releases information or money only with the agent's explicit consent. The purpose of this principle is to engender trust in the system and to ensure privacy when dealing with multiple agencies.

The Distributed Network

A Network Rather Than A (Single) System

What we are proposing is a set of inter-related applications distributed over the internet and communicating with each other. This seems to me to be the single major factor distinguishing our approach from other approaches as defined in IEEE/P1484.1/D9 of IMS Repositories. This is accomplished in three major steps:

- Separating the functionality of an LCMS / LMS architecture into distinct, stand-alone components that communicate over TCP/IP
- Allowing (encouraging) the development of multiple instances of these components
- Providing indexing or registries of these instances

Thus, for example, instead of envisioning a single metadata repository that indexes all learning objects (or, as we see within common practice, all learning objects within a specific domain, such as a geographic region or company), we envision multiple learning object repositories that may or may not focus on a particular domain.

In other words, the model we are envisioning resembles much more the model employed by the world wide web than it does the model envisioned by a content management system. In my opinion, this is a key turning point.

Core Components of the Network

- Learning Object Repository - hosted by vendors on vendor sites, provides vendor metadata and learning object servers
- Metadata Repository - hosted elsewhere, harvests metadata from vendors and amalgamates, allows queries from eLearning systems. Norm Friesen has written a useful backgrounder on harvesting: <http://www.cancore.ca/harvesting.doc>
- eLearning system - queries metadata repository, user selects resource, retrieves resource from learning object repository, displays

This core functionality is relatively simple and is already established in other domains, for example, in news syndication. Consider the following combination of components:

- News Object Repository - Original articles are posted on news site and RSS metadata is available for harvesting
- Metadata Aggregator - such as NewsIsFree collects metadata, indexes (maybe) and provides (topic-specific, sometimes) search
- News Viewer - such as Amphetadesk - accesses the aggregator for an index, then retrieves the selected item from the news repository

Contrast to Library Model

Most other implementations, including IEEE/P1484.1/D9, employ a model whereby learning materials are akin to books in a library (or, in some other way, 'content' to be managed). Consequently, they envision that implementations of the architecture will access collections of this content, typically (but not always) stored on location. The process they envision is therefore:

- Acquire the content
- Index or classify the content
- Deploy the content

In a network model, there is no need to manage collections of content. So instead of working with learning objects specifically (as defined by IEEE/P1484.12.1 or pick your specification) the network works more generally with what may be called learning resources, or even more precisely, learning opportunities. This includes, but is not limited to:

- Learning objects, properly so-called
- Other academic works, such as journal articles
- In-person classes or seminars
- Instructors, coaches and tutors

While it is permissible to search for a specific category of learning opportunities, such as a learning object, the design does not require that all resource fit that particular category. This is enabled by tolerating the use of different schemas in learning object repositories.

Learning opportunities in this model should therefore more accurately be thought of as akin to 'processes' rather than 'things'. The desired result of, say, a learning object search system is not so much to acquire a resource as it is to locate it and, when appropriate, display it or run it.

Part or all of the learning resource may or may not be cached on location, but this is left to the discretion of the particular instance and is not a defining feature of the system.

Component Registry Services

In the network proposed, there are multiple instances of each component. Of course there are multiple learning objects. But there is in addition multiple learning object repositories (typically, one for each learning object vendor) and multiple metadata repositories.

In order to provide access to these resources, it is necessary to provide indexing or registry services. The purpose of these services is multifold:

- To provide a list of the available instances

- To establish and verify ownership of these resources, for the purpose of maintaining or updating information about them in the system

For example, consider the list of learning object repositories. A vendor wishing to offer learning objects through the network will need to declare that the repository exists and where to find the list of available resources. By registering the repository, the vendor is able to make its presence known and to ensure that important information – such as its URI – will not be changed by third parties.

The registry system envisioned is consistent with existing approaches to the provision of services on the internet. It is anticipated that the repository indexing service would resemble the UDDI and WSDL protocols.

Norm Friesen has written a useful discussion regarding the registration and indexing of resources. <http://www.cancore.ca/Resourceids.doc>

Functionality of the System versus Functionality of the Learning Resource

Many models of learning object architecture presuppose that the system being deployed contains a great deal of functionality. For example, IEEE/P1484.1/D9 includes as two (of the four) essential components the ‘coach’ function and the ‘evaluation’ function. A wide variety of other functions are embedded in LMS and LCMS design, for example, class registration, discussion and chat.

The weakness of this approach is that the purchaser of an LMS or LCMS is restricted to only one choice in the delivery of these functions, that is for example, restricted to only one discussion board or one class registration system. This makes LMS and LCMS systems needlessly complex, and needlessly restricts the range of options available to the purchaser. Thus, such functionality is envisioned in this model to reside in the learning opportunity, thus greatly increasing the range of choice available to developers.

This functionality of the system is therefore defined in the learning opportunity, rather than in the system itself. This is the most immediate and obvious different between this approach and IEEE/P1484.1/D9. In the IEEE draft standard, elements such as ‘coach’ and ‘evaluation’ are defined as components of the architecture. On this model, they are resources that may be deployed within the architecture.

Secondary Components

In addition to the three core elements, a number of secondary elements are also required in order to meet a number of the objectives of learners, learning institutions and content providers. As in the case of the core components, there may be multiple instances of any secondary component. This allows users of any core component to exercise choice in the selection of secondary components. These components include:

- A system of third-party metadata
- A digital rights system
- A learner (user) information system
- A reporting or tracking system

What is significantly different about this model and models envisioned in IEEE/P1484.1/D9 and IMS Repositories is that:

- The components are optional: you develop (or buy) them and use them only if you need them
- For any given component, you may select one of many instances
- These components may reside outside your own system

As in the case of the primary components, a registry service is developed for each type of secondary component.

Third Party Metadata

Third-party metadata is a crucial component of the network that is not really envisioned by IEEE-LOM or IMS (though to be fair they do permit reference to third party ontologies, as in IEEE/P1484.12.1 9.21 and 9.22. See <http://www2002.org/CDROM/alternate/744/index.html> for some description and uses of third party metadata.

The core principle of third party metadata is that there may be multiple metadata files, perhaps even located on different hosts, written by different authors (some for-profit), that describe a single learning resource.

For example, a single learning resource may have associated with it:

- A description, in IEEE/P1484.12.1, created by the author or owner of the learning object
- An indication of certification, using a specialized metadata schema, provided by a professional association
- Metadata containing a review (or a reference to a review), provided by a public service agency
- Digital rights information, authored by and hosted by a DRM handling company
- Classification of the object, authored and hosted by a library authority

Digital Rights Management

A principle objective of the digital rights system (DRM) enabled by the network is to create a system where multiple suppliers work through a common interface. To enable this, it is important to provide a choice of business models. A business model consists of two essential components:

- The definition of the business rules, and
- The application of the rules in software functionality

In traditional DRM, the definition of business rules is represented in specific DRM metadata. Two major approaches exist, ODRL and XrML, though numerous sub-variants exist. These approaches are XML schemas defining the allowable documentation of specific rights for a specific (group of) learning object(s). See <http://xml.coverpages.org/drm.html>

In order to establish DRM for a given learning resource, the metadata associated with this resource identifies the metadata, usually managed by a third party (see below), defining the DRM associated with the learning resource.

Beyond Digital Rights Management: Employee/Consumer Rules

Most examinations of DRM deal in general with the application of business rules to learning object transactions. For the most part, these are rules established by the content owner or vendor. But it is important to look beyond the traditional formulations whereby all the rules are established by the vendor. Classes of employee/consumer rules will also be identified and handled by different parts of the system.

An approach similar to DRM is taken for the definition of employee/consumer rules. Using a (n as yet undefined) XML schema, the various employee/consumer rules, such as the ones you've listed above, are defined in an XML file owned by the employee/consumer. This file may be maintained by a personal information service or buyer's agent (several such files may exist to handle different aspects of employee/consumer rules - for example, pricing, personal information, financial information and presentation will likely be located in different files, handled by different systems).

These rules are applied by various subsystems: the metadata repository, the learning object retrieval system, and the viewer itself.

Employer Rules

Employer rules are established using the same system as employee/consumer rules. By 'employer' in this document we could also include entities such as school boards, colleges or universities, professional associations, and indeed, any third party given permission by the employee or consumer to apply rules.

During processing, if employer rules apply (a consumer/employee uses the same system for job training as, say, hobby learning), then the employer rules are merged with the consumer/employee rules. They are then applied in the subsystem as appropriate.

Learner / User Information System

An additional secondary component is a set of learner information systems. The concept is similar to the 'resume' or 'portfolio' system described by Chuck Hamilton of IBM at NAWeb. Details to follow.

Notes

[1] This paragraph was significantly informed by Norm Friesen and Toni Roberts.

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While I was in Milan I was able to listen to Gilly Salmon talk, and after she finished, I presented her with a napkin sketch in order to show that the other 'worlds' described in her paper play an equal and important role (they are, in fact, simply different 'layers' in our network). She said something to the effect that she had already considered that point of view, so I shelved the paper I had been writing in my mind. Vicki Hollet's email resurrected the notion, since it appeared that the emphasis on the learning experience would rationalize the network out of existence. So this paper comes at the topic from the other side: understanding how the content network related to the human, as opposed to the technology. It is probably one of my more extended discussions of the concept of emergence, so important in relation to my other work. And as an aside, crucially: emergence is why design is unnecessary. It's that homunculus again.

The Lattecentric Ecosystem

November 20, 2002. I would have sworn I published this somewhere, but either I forgot to publish it or have forgotten where it was published.

Vicki Hollet [writes](#),

what about the learner? Instead of having a course that flows and progresses and engages their interest, they're going to get a set of sterile stand-alone modular objects. They will have had any vaguely interesting idiosyncratic features carefully formatted out of them so they can be (hopefully) seamlessly attached to the next personality-less RTO. And I look at it all and think, but surely for learners to learn, we want to tickle their intellects, and reward them with intriguing new thoughts. How can we expect them to engage with personality-free disjointed nuggets? And aren't we going to try to surprise them any more?

1.

When I was a student what I learned to hate was that professor who was more personality than content. Every day was a surprise, which meant I never had any idea what I was going to learn and had no way to prepare for it. Oh, certainly, I had a lot of fun (it is very easy to distract a professor like that) but at the end of the course I did not know a lot more than I knew going in - and I didn't know what it was that I had learned.

The fact is that it is not true that a sequence of, say, molecules, results in a whole with no continuity. If this were so, we could not have continuous surfaces, such as, say, desks, composed out of molecules. Or our language, composed as it is out of atomic words, could never achieve the elegance and rhythm of a Shakespeare sonnet.

Hollet's error here (and it is a very common error) lies in presupposing that the whole must be somehow contained in the parts. That unless there is some manifestation in each molecule of a surface, that a collection of molecules could never create a surface. But the whole is the emergent property of the set of the parts. Though no brick could ever aspire to be six feet tall, the collection of them, in some sort of non-random order, can build a wall.

There is a great deal of evidence to suppose that elegance and even beauty can be assembled from a set of inelegant and ugly parts, that coherence may be obtained from a set of unrelated entities. I have mentioned molecules a few times. Perhaps also consider the function of the brain, in which a set of connected but autonomous neurons managed to create the Sistine Chapel. Or perhaps

consider Minsky's theory of the [society of mind](#), in which cognition arises from the set of autonomous agents.

It will take a great deal more argumentation to show that this phenomenon, which is repeated throughout nature and human endeavour, cannot succeed here as well. And if some of the first creations have been bland and uninspiring, like a child's pile of blocks, well perhaps that is to be expected in the first few years of effort. I see no reason why elegant learning objects each dedicated to explaining a particular concept cannot, when assembled, engage and even surprise.

I would like as well to address some comments offered by [Diana Carl](#), who notes that "the approach described by Ms. Hollet works very well for training and situations in which observable, measurable changes in work performance is the desired outcomes. However, in an academic setting where the learner's use of content is less defined and [intentionally] less predictable, it harnesses the experience."

Now I think that Carl has a point, but it is a point that should be drawn out a bit. This concerns the question of how the content of a learning object should be defined. What is the taxonomy by which a given subject area should be described?

As Carl suggests, it really does depend on what you are up to. In some environments, a performance based taxonomy is appropriate because we have specific performances in mind as outcomes. This is often the case in the military or in business, where the learner is expected to be able to perform a specific function as a result of learning. In other areas, however, this is not the case. But this does not mean no taxonomy is possible, it means simply that it is defined differently. In a university class, for example, the division of a course of study into components may be based on the subject matter. First we'll look at Act I and then we'll look at Act II. First we'll examine character as the struggle between good and evil, then we'll look at the theme of portent and omen.

It is arguable - and I would argue - that any academic approach can be broken down in this way (or conversely, that any instructor who is not able to identify subtopics in the material does not, in fact, understand the material). For otherwise it would be impossible to divide programmes into courses, courses into classes, books into chapters, philosophers into schools, phenomena into categories.

The key understanding here is that there is not, and never will be, one correct approach to the identification of different parts of a field of enquiry. And that in some cases one means of identification will be inappropriate in a given circumstance. An academic study of a language would find a list of practical phrases absurd and useless, but for someone travelling to Italy for the first time, practical phrases - and not an overview of Italian grammar - are what is needed. The taxonomy depends on the circumstance.

And as Carl suggests, a blend is often the best approach. "Like any professional, I have to choose my tools and interventions according to the situation that is going to best help the client for the learning get what will truly help."

She continues, "understanding the cognitive mapping issue in constructivism is important in developing SCOs. Whether it is discipline-specific such as is nurtured within a university, or whether it is culture-specific, as nurtured within a foreign culture, or whether it is mapping associated with the unique way an individual has come to view the world, employing this map

when SCOs are developed helps make SCOs reusable in a constructivist way so that in the end the tools available to the learner help her or him "construct" their own new knowledge."

I think this is exactly right. And as a consequence it is important not to confuse the intent of SCORM with the implementation, particularly as it has occurred in the military and the corporate context. Organizing content the SCORM way (whatever way that is) might be inappropriate in an academic context. But even if it is inappropriate, it does not follow that there is no appropriate way to organize content. And indeed, there must be, for otherwise all academic learning would be formless and shapeless. Just as a military manual would be a little out of place in a university English class (and a book of Sonnets out of place in a tactical exercise), we need to understand that different approaches to learning objects are appropriate in different settings.

This is why, when I write about learning objects, one of my over-riding concerns is directed toward multiple semantics. That is, we need to be able to use various flavours of learning object metadata to describe learning objects. Indeed, the choice of taxonomy itself will help professors and students choose between performance related content, as described using SCORM, and concept related content, as described in, say, UECML (University English Content Markup Language (it doesn't exist, I made that up)).

SCORM is most appropriately described as an "application profile". That is, it starts with a basic vocabulary (a standard, known as IEEE-LOM) and tailors it for a specific use. It is, in my opinion, the first of many application profiles that will be developed, each tailored toward a particular application. What we need to learn is how to manage different vocabularies in metadata as easily as we do the same thing in English, to be able to determine by context, say, whether what we mean by a 'calf' is a farm animal or part of the human anatomy.

2.

Please let me respond to Brad Jensen's brief challenge to the comments above and to some of Steve Eskow's comments.

Jensen [writes](#), "Okay Stephen, you are generating a ton of content day by day. How much of it have you structured and tagged as RLOs (Reusable Learning Objects) and where is it and how do we use it?"

Since 1998, my content has been tagged using a metadata system known as RSS (specifically, RSS 0.91). RSS (it stands for 'Rich Site Summary') is intended for syndicated news content. RSS is more appropriate for my purposes because my content is more like news and articles than online courses. But the method and the purpose is the same.

For example, I generate an RSS version of my newsletter every day. You can find this RSS file at <http://www.downes.ca/news/OLDaily.rss> (you may need to right-click on this file to download it). This RSS file is generated automatically by the smae system that generates my newsletter in text, HTML and Javascript versions.

The easiest way to use my XML content is to download a product called 'Amphetadesk' and install it. Amphetadesk is what is generically called an RSS headline viewer. It is in essence what is missing in the world of learning objects: a quick means to locate and view learning objects. Once you have installed Amphetadesk go to the web version of my newsletter at

<http://www.downes.ca/news/OLDaily.htm> and click on the orange icon with the pill at the bottom of the page. This will cause Amphetadesk to automatically retrieve my content (along with any of many other syndicated news sites).

Amphetadesk is one of several tools for viewing RSS-syndicated content. You can also view directories of RSS content at newsisfree.com (or just Google for RSS viewers and RSS directories). They vary in their utility, and none of them provides everything I would like, but the essential point is that they work and they are currently in use by tens of thousands of news sites and millions of users.

Much of what I have had to write about learning objects has been informed by my work over the last few years on syndicated news content. It is my opinion, and I have expressed this in numerous cases, that the structure of a learning object network should resemble that of an RSS network. Once again, let me refer you to the paper I delivered in Milan <http://www.downes.ca/files.milan.doc>, where the principles and structure I propose echo and improve upon the RSS network structure.

It may be argued that, because I have elected to use RSS instead of, say, SCORM or AICC, that I have not in fact created learning objects (we will leave aside the fact that it would be trivial to do so, since having already created RSS files I need only create a new template to create these other sorts of metadata).

But part of what I asserted in my previous message stresses that it would be absurd to adopt one and only one metadata schema for the tagging of content, even educational content. SCORM was created for a very specific sort of object; my work is a different sort of object. Many other educational objects (some people call them knowledge objects) are in a similar category. It would be absurd, for example, to assign many of the SCORM tags to an image; an image is not the sort of thing that has (innate) educational outcomes. Much more appropriate for images would be an image markup language.

The question, then, is whether learning content management systems (LCMSs) and learning management systems (LMSs) should be able to locate and use these alternative sources of content. I believe strongly that they should. It is likely, for example, that some of my articles may be of use in online courses. The articles should not be excluded from view because they have been tagged in RSS. A proper LCMS (or learning object network) should allow for the selection of wide varieties of content, depending on preferences exercised by the user.

The other part of Jensen's question - beyond whether my work is properly tagged - is whether I have included appropriate 'wrappers' around my content so that they can interact with learning management systems when in use. The short answer is no, and the reason for this is that I don't believe it is necessary. It is my opinion that if the LMS requires special coding (even if only simple Javascript calls) in order to display an HTML page, then it is broken. An LMS, when presented with learning material without appropriate wrappers, should provide default wrappers.

3.

Jensen continues, "I'm not trying to put you on the spot. I'm trying to point out that creating RLOs is a pain, and until there is some universal place to go and find them, as a reminder that a person has placed content there, they just won't have any critical mass. I suggest you create such an archive, if you really think they are useful, then have a link at the trailer of each of your emails

that says: here are my free/paid RLOs, here's my major subject area, click here for the search engine. Then get everyone you know to do the same."

That is in fact exactly what I am doing. In my work with the [eduSource](#) project in Canada (and with a number of smaller and parallel initiatives) I am working toward the establishment of what I call a 'distributed learning object repository network' (or DLORN). The purpose of the DLORN will be to create an open marketplace for the exchange of learning objects (and other educational resources) using a wider variety of metadata. Part of DLORN essentially involves the creation of what I call a 'learning object browser'.

Other projects are directed toward the same objective, and I would not be surprised if some entity with greater software resources that I have access to will be able to create, say, a learning object browser before I can. That's all right with me, particularly if I am able to work with such people to establish compatibility between their software and ours. Our intent is to build an open source royalty-free version of the network with simple and usable components. The more versions of each component, the better.

To change subjects, now, both Jensen and Eskow have difficulties with my use of emergent properties to explain how order may be obtained out of learning object chaos. The phenomenon of emergence is well recognized in other fields, which is why I sought to explain what I meant by analogy.

Jensen suggests, "You cannot tag a sonnet as RLOs and expect to use a phrase here and a couplet there, and come out with more sonnets."

This is simply false, but the falsity is obscured by a misunderstanding of the granularity of the parts and the syntax used for tagging. At the lowest level of granularity, Shakespeare is working with a set of 26 letters. In the use of letters, ordering is important (reminds me of IMS's simple sequencing). Letters are not tagged per se, but as physical entities their nature is clearly indicated by physical shape.

At the next level of granularity, Shakespeare is using words (and indeed, for the most part he does not invent words in the manner of, say Carroll, but uses the set of 50,000 or so previously created words available to him at the time). Words are tagged by the use of a single space and some basic and simple punctuation: periods, commas and the like. Again, the order of the words is important.

But note: the tagging, the ordering, even the meaning of the words is not contained in the word itself. The meaning of the sentence cannot be found by studying individual words in isolation. It is only when looking at the sentence as a whole (or if you're Chomsky, by looking at the syntactic structures embodied in the sentence) that an understanding of the meaning may be obtained. The meaning of the sentence is an emergent property of the sentence: it may be found only by considering the entire sentence, and even then, only when viewed in a context of reference or representation.

This is why a word such as 'calf' is a useful example of a learning object. By itself, it is of extremely limited semantical value. If I simply went to someone and uttered the word 'calf' then (unless I am in a fine restaurant with a tolerant waiter) my intent and signification would be opaque. The meaning and relevance of my utterance is significant only in the wider context. In this way, the meaning of the word 'calf' combines with that of the other words in the sentence, and the contextual surround, in order to create a meaning that is quite over and above what is

contained in the original component.

This isn't Zen or magic or anything mystical. It is a commonly understood and utterly repeatable property of networks (in the case of a sentence, a semantical linear network). Learning objects, like words, are nothing over and above nodes in this network. What makes them interesting, what makes them pedagogically useful, is the manner in which they are combined. A single image is of limited value; a series of images linked together can create a (silent) movie. A single instant of perception is by itself meaningless; a series of perceptions ordered creates a lifetime of experiences.

Jensen continues, "I don't follow this as an abstraction of her argument. It seems to me that it is the RLO argument to think if you chop up Shakespeare and reuses parts, you might get Yeats."

On the account I have just given, this is not only possible but likely. Reduce all of Shakespeare to a set of words and bundle these words into a repository (for simplicity, I will simply call this a 'dictionary'). From this dictionary one can obtain all the elements needed in order to create Yeats.

People should stop thinking of learning objects as though they were classes or lessons or some such thing with built-in intent, at least from the point of view of thinking about how they are used. It is much preferable to think of them as a greatly enhanced vocabulary that can be used in a multi-dimensional (as opposed to merely linear) network.

Criticisms such as Jensen's and Hollet's seem to me to be like somebody holding up an instance of the letter 'T' and saying, "I just don't get it." But there is nothing in the letter 'T' that suggests that it could be a part of the word 'To' just as there is nothing in the word 'To' that suggests that it could be part of the sentence 'To be or not to be.' In a similar fashion, there is nothing in one of my objects, one of my 100 word essays (of which I produce a half dozen each day), to suggest a wider philosophy, but ordered in a certain way, themes and concepts emerge (I try to capture this with the 'Research' feature of my website, using regular expressions to create sequences of objects).

Jensen's postscript (perhaps he has had second thoughts) comes much closer to the truth: "You want an metadata with the granularity of English that is not English itself. Maybe the content is its own metadata, and what you need is a search engine that is thesaurized. Another possibility might be for a content analyzer that is vocabulary driven, and rates documents for similarities to other documents (similar relatively unique words, content semaphores such as 'Lewinsky', etc.)"

4.

I would like now to turn to [Steve Eskow](#) because I think he demonstrates some extraordinary insight in his comments, even if he does say that my argument is based on a fundamental misunderstanding.

Eskow gets my point exactly: "Steve wants us to understand that letters and words do not of themselves combine and cohere into a sonnet that begins 'When in disgrace with fortune and men's eyes,' or 'Shall I compare thee to a summer's day?'"

He then moves to the next step of the inference: "Shakespeare designed beauty out of growls and grunts and vowels and consonants, and Steve is wanting to lead us to accept the notion that the

'instructional system designer' similarly takes inelegant and ugly parts and creates a 'course' that is a thing of elegance and beauty."

Then he attributes to me the following error: "The error to which Steve's elegantly constructed argument is leading us to is, if the critics of ISD are at all right, is this: It is not the instructor who has to create learning out of bits and pieces, often crude and inelegant, but the student."

Here Steve leads the reader elegantly in three paragraphs to a conclusion I would whole-heartedly endorse, and indeed, have explicitly stated on numerous occasions (as for example, in my essay [In Practice...](#) and in various presentations about online learning environments).

He continues, "A course ought not to be, or need not be, a thing of beauty for students and accrediting bodies to look at with awe and reverence, judged like we judge the Sistine Chapel or a Shakespearian sonnet. It often needs to be a thing of shreds and patches that requires the student to do the hard work of organizing into form: of connecting the dots, as the current cliché would have it."

Eskow endorses, with a good reference to Arthur Chickering's "Education and Identity," a "junkyard curriculum made up of pieces of stuff found by instructors and students and assembled into coherence mostly by students."

I completely concur. I have long felt that the attempt to organize bits of instruction into neatly packaged courses is a mistake. That does not mean that the presentation of materials to students is completely without order: rather, it is to argue that the grammar of such presentation is no, should not be, a linear sequencing of prepackaged learning events, a presentation in which the student is nothing more than a mere spectator. Such a presentation is effective for the sequencing of letters and words, but just as the set of rules for ordering letters is different from the set of rules for ordering words, so also is the set of rules for ordering higher order constructions (aka and now almost meaninglessly called 'learning objects').

My belief is that the grammar for organizing higher order constructions is the grammar governing semantical networks. I believe that examples of this grammar exist, and that the organization and presentation of layers of increasingly complex concepts should (in the first instance, at least, until and unless we find a better way) emulate this grammar.

This grammar is instantiated in the design of the human brain and has been modelled in neural networks. What I am after here is not simply a mere mimicking, though, but an understanding of the design parameters: an understanding of why such a network functions as it does.

A network is essentially a collection of points in a multi-dimensional space. Each one of these points is a representation of a higher order construction - an image, a 100-word essay, a concept. In the literature there are various attempts to define what these must be (I don't have the references at hand, but I'm thinking of people like Land and Kosslyn).

The grammar of the network is therefore the set of rules describing the connectivity of the points in the network. A very simple (and incorrect) grammar would be to take a sequence of points (a sequence of concepts, a sequence of learning objects) and join them in a linear fashion. This, unfortunately, is an extremely limited and inflexible grammar.

But none would it be of any use to create a system whereby every concept is joined to every other.

As Francisco Varela shows, the idea point of connectivity in a network is somewhere in the middle. You get meaningful emergent patterns if networks are only partially connected. Intuitively, this makes sense. If you sought meaning from the world wide web, just as a list of zero pages would not help you, so also would a list of every page. But neither would a list of one page, which is what you get in a linear sequence. You need a mechanism whereby connections between the pages are limited in number, therefore restricting your view, but not overly limited.

In neural networks (such as, say, image processing), this limited connectedness is obtained by organizing the neurons into layers. One layer of neurons can connect to the next layer of neurons, but no further; to get to the third layer of neurons you must proceed first through the second layer. The act of moving from one layer to the next changes your state; the concept you are working with has changed. It has become a combination of concepts, or it has been an abstraction of the concept. A sequence of movements through the layers (both forward and backward) creates a series of patterns of activation, and through this, a more complex construct emerges, just as the meaning of a sentence emerges by means of a movement through the sequence of words (or some other form of perceiving the words).

So the organization of learning content - of learning objects, as it were, though we find now that this designation refers only to one layer in a much more complex ecosystem - in a learning environment ought to proceed by defining layers of interconnected resources. The art of instructional design, therefore, comes in the placement of a student somewhere within that ecosystem and the identification of relevant connections. The student, by navigating (perhaps in some goal-directed way, perhaps out of curiosity and interest - this is part of the design) therefore creates a new entity, perhaps by identifying new connections, perhaps by deducing abstractions already present (but not revealed) in the network, perhaps by an analysis of the nature and role of component parts.

5.

Some of Gilly Salmon's recent work gives us a first approximation of what such an environment would look like. Salmon identifies four major types of educational ecosystems (or 'worlds' as she puts it). To briefly recapitulate [Gilly Salmon's Four 'Worlds'](#):

Contenteous

- technology as a delivery system for content
- instructors as content experts
- libraries, repositories, databases
- institutionally centered

Instantia

- based on the idea of learning objects
- instructors as content assemblers
- context-sensitive, just-in-time learning
- repository or aggregator centered

Nomadict

- learning travels with the learner
- mobile learning, alternative delivery systems
- learner centered
- instructors as 24-hour help desks

Cafélattia

- learning communities, communities of practice
- asynchronous and synchronous communication
- focus on professional development and tacit knowledge
- instructors as moderators

The entities in each of Salmon's four worlds are very different. They differ in granularity, they differ in use, they differ in meaning and function. As Salmon, with a cynical wit, observes, it would make no sense to design an educational strategy in anyone of these worlds. An education based on (sequences) of content only would be meaningless.

Salmon presents these as four alternatives, from which we must make a choice (as a literary device, she tells me). But of course they are not four separate alternatives: they are layers of interrelated types of content. They form a single ecosystem. Salmon also argues in favour of education at the level called Cafélattia. This creates what I would call a lattecentric view of education. But learning communities do not exist in isolation; a lattecentric ecosystem is at the center (or the bottom, depending on your perspective) of an atmosphere made up of the other three layers.

Now the sort of conversation that we envision happening in a café consists of sentence and words. This is what confuses us. It is difficult to see how any of the other layers could be relevant when they are made up of the different sort of discourse that occurs in a café. But as I tried to argue in [The New Literacy](#) we have a much wider range of semantical entities to choose from when conducting these conversations. Though words and sentences could be used, they allow a far narrower a range of conversation than could occur in a fully developed ecosystem.

We would expect students to converse using a wide range of complex objects, composed perhaps of words and images and other multimedia, arranged in some cases in linear fashion but more commonly as a network of related concepts, as parallel and multi-tacked constructs, thus employing a vocabulary far wider than our meagre collection of 50,000 words may employ. This vocabulary is the set of objects available in the ecosystem, a set of objects selected from (using Jensen's 'thesaurus' of learning- or concept-objects) the environment, the next layer of the atmosphere.

Educational design, in the first instance, therefore consists in the creation of these environments, of the writing of a (modified and perhaps restructured) version of the thesarus, making a certain relevant set of objects available for discourse, or providing the tools for and motivation for interaction and the construction, either individually or in groups, of new entities, of the creation of mechanisms and guidelines for pointing, suggesting, even cajoling, of having a broader understanding of the wider ecosystem and of creating a microcosm of that ecosystem.

Educational design, in the second instance, lies in the creation of these objects and mechanisms through which they would be delivered. At greater levels of complexity, such objects may have

the specific intent to teach a concept, and may resemble a traditional design of learning objectives, content, exercises and even assessment. But many other designs are possible: simple simulations designed to animate a concept, a collection of film clips designed to illustrate a sequence of events, summaries and analyses of articles and papers and more.

At yet a further layer, educational design involves the creation of the raw materials from which these more complex entities are constructed, the creation of single clips from which a sequence is derived, the creation of expository works out of which a lesson is designed. There is no attempt at this level to recreate the entire educational experience; the point is to create, if you will, a large and complex vocabulary of individual concepts.

And the nature of instructional systems design, properly so-called, lies in the creation of networks of interactions between these layers, in the manner in which raw materials will be presented for use by people creating learning objects, and in the manner in which learning objects are presented to students working within a learner-centric educational environment.

The vast confusion in the field of learning objects arises when we conflate all of these tasks as being a single task, when we try to compress all the levels of educational design into a single level. It occurs when we presuppose that one single sort of semantics (such as, say, SCORM) could adequately describe the myriad entities and connections available in and between the different layers. Each sort of entity, each sort of connection, requires its own semantics, and the set of semantics taken collectively represents the grammar that governs the network.

So people like Jensen ask, where is this network and why aren't you using it. And of course the network as a whole does not yet exist, though component parts are coming into play. And just so, I use RSS because RSS is the appropriate semantics for my little bit of a fairly simple (and non-educational) layer, in anticipation of the time when the creation of the appropriate layers enabling semantic interaction may take my work and, through aggregation, abstraction and interpretation, make it the sort of entity that may be exchanged and used productively in a learning environment.

And it is also with this model in mind that I am working on the design of a distributed learning object repository network. What I am working toward, through both the identification and creation of transport protocols and semantical networks, is the creation of a mechanism that instantiates the transmission of content (very widely conceived) one layer to the next. And I am working to identify simple instances of learning environments, instantiated by such tools as Amphetadesk, where a multi-layer transmission of information occurs.

This is an angry paper, and it is angry because the guardians of the old – those intermediaries who want to continue to play the role of the little man in the machine – want also to keep all the profits, and to prevent the free flow of other content. This in an age when, as I describe above, the value of content is dramatically reduced. Moreover, in the copyright wars that erupted in the early 2000s, they had the gall to lay claim to the moral high ground. Well, it doesn't work like that. They are the barriers in the network, the grit impeding the free flow of information, the authorities acting contrary to the natural rationality that can and should emerge with greater connectivity. Their ethic is directly contrary to the values and ideas expressed in this work, and though their position is not tenable, they can cause a lot of damage in the mean time.

Copyright, Ethics and Theft

Written on January 5, 2003. Published in [USDLA Journal](#), April 7, 2003.

The relation between copyright and ethics is not nearly so clear as supposed. While it is easy to piously pronounce that people who copy online content are unethical and even evil, it is also wrong. The copyright debate is not a case of the morally right trying to maintain the defense against the morally wrong. It is a debate about what should even count as morally right or wrong.

Preamble

A discussion has erupted on [trdev](#) discussion list, hosted on Yahoo! Groups, about the copying of members' posts to another Yahoo! Groups discussion list. As one member wrote, "In other words, people are participating on lists, and then someone is taking their posts and putting it on the Training Ideas list without their permission. Then others are replying to these bogus messages, generating activity on the Training Ideas list."

I posted a response to trdev to the effect that "this is pretty funny" and with the observation that "there was zero chance of getting away with it." I also commented that "this is a (more or less) public bulletin board. When you write here, it's like you're tacking your missive to the office wall. Sometimes people will move your post, sometimes they'll photocopy it (on the office photocopier with company paper). You've put your words 'out there.' They're going to get circulated. If you didn't want that to happen, then you should never have posted them on the open web."

A number of people replied to my comments and to similar comments offered by Brad Jensen. The tenor of these comments varied but the message was uniform: not only was it inappropriate for someone to copy these posts to another list, it was probably illegal and most certainly ethically wrong. One person even wrote that it was evil.

Illegal? Ethically wrong? Evil?

1.

I have been working in the field of online learning for a long time. I have written volumes of materials concerning the design, pedagogy and technology behind online learning. I have even been paid for my work from time to time, paid enough that I have on occasion contemplated building a business based on my writing and thinking. And even though I am happily employed as a government researcher, my personal website remains my calling card, establishing my

credentials and expertise, acting as my personal forum, functioning as my online research lab.

Over the years I have seen most of what I have written appear, in one form or another, elsewhere on the web. Very often, entire texts were copied to other websites. More, often, though, what I see are my concepts and ideas repeated elsewhere. Not just what I have printed in text, but features and attributes of software I have designed and shared over the net. Descriptions of the future of online learning. Designs for online learning modules (now called learning objects). Outlines of essential attributes for online communities. The learning object economy.

But even where the concepts are not explicitly attributed to me (and very frequently, they are not), I do not consider this to be theft. For what I have done is to throw an idea or a concept out into the public commons, using a medium explicitly designed for that purpose. I expect it to be shared, and if it is a good idea, replicated throughout the online world. I have no problem with that.

What I have also seen, though, disturbs me a lot more. Many of the concepts and ideas that I and others have distributed through the open web have been appropriated by others as their own personal property. Scanning through the U.S. patent web page, for example, I see ideas that I have discussed in person or in print listed as patents granted to major corporations. Common terminology is registered as trademarks. And the concepts and ideas are codified as academic articles, granted copyright, and locked away as having been 'discovered' by the author in question (yours to view for only thirty dollars an item).

To me, this is theft. It comes in many guises, many forms. But it has in every incarnation the same appearance, the removal of something from the common domain and the making of that idea or concept the property of some person or corporation with the resources to defend it. It has become nearly impossible to simply share an idea on the open internet without it being stolen in this way. And (to judge from the list of patents) it seems that anything new that appears on the net is instantly seized upon by a horde of vultures determined to profit from someone else's work. How did it come to this?

Now I can hear your response already. I could have protected my work, you say, had I merely copyrighted it, or as applicable, registered a trademark or filed a patent. Well, yes, I could, which is why today the Creative Commons logo is attached to all of my work. But this is only a reluctant admission that the system is deeply broken. And worse, it legitimizes all those copyrights and trademarks and patents. It allows these vultures to say that they have legitimately acquired that which they have stolen.

Copyright, from my perspective, is a haven for thieves. It is a license to claim ownership over anything you might happen to find on the internet (and elsewhere) that isn't clearly nailed down. Worse, it is providing a means for those who enter this free and open space called the internet to put up fences and say "this is mine," to appropriate a network designed for open exchange and to convert it to a private publication and distribution system.

2.

In the replies to my previous post most writers staked the ethical high ground. "It is not pointless," writes David Ferguson, "for members of a list to decry a practice that is technically illegal and certainly unethical." Will Pearce expresses the hope "that we will choose to maintain the high level of ethics [and] integrity." Robert Bacal wrote, "As an author and intellectual

property creator, I'm just frickin fed up with rationalizations and defences of decrepit dishonest behavior." And Christopher Tipton states it bluntly. "Plagiarism is thievery."

I do not concede this ethical high ground so easily. I do not think it is so clear and obvious that the reuse of someone's content is such a breach of morals. And leaving aside the question of what the law in fact says, I certainly do not think that such reuse should be illegal.

How can I say this, you ask? Well, would it bother anyone if I retrieved my stereo system from the burglar who broke into my house and took it? Would it be all right were I once again to drive my car after having recovered it from a thief? Obviously. Retrieving and reusing something that has been stolen from me is obviously something that is ethically permissible. And in just the same way, retrieving and reusing something that has been stolen from the public domain is something any person should have the right to do.

Where the error lies in the current interpretation and application of copyright law is in the presumption that the many multifarious works produced by the members of this and other lists, much less the applications filed for copyright, patent or trademark, are the original creation of the author. It is simply not so. Though original authorship is frequently claimed, it is seldom, if ever the case. Even the greatest work of prose stands, as they say, on the work of giants.

As I look through the various posts that comprise the digest to which I now respond, I am witness to a large number of concepts, ideas, sentiments and even expressions that clearly have their origin in some prior source, an origin that is unattributed, an origin that the author does not even acknowledge exists. "Plagiarism is thievery," writes Christopher Tipton. Well congratulations to Mr. Tipton for having come up with that original idea! Should I now respect his ownership of those words? His origination of that idea? Of course not. It would be absurd. And yet, according to the many writings of authors asserting that I must respect copyright, that is exactly what I must do.

3.

I recognize that the principle of copyright is not to protect an idea, but rather, the specific expression of that idea. That is why it is legal, say, to express in your own words the ideas that you may have found elsewhere. Thus, IMS (say) can create and copyright the idea of a "search application" without ever having acknowledged to having ever heard of a metadata repository before. That is how someone from MIT can blandly assert that the Open Courseware project was devised entirely by staff from that institution, without acknowledging any external influence or source for that idea.

But this line is blurring. With the advent of "business methods" patents in the United States, with the ever widening use of trademarks to appropriate common terms and abbreviations, the idea itself is increasingly becoming a type of property. The term Freenet, for example, was in wide use before it and the concept were trademarked, thus forcing an entire sphere of activity to call itself instead "community networking." The term "blog" was around long before Blogger became a trademark, and now the method and manner of posting your thoughts to a website has become private property. "One click" - not just the words, but the practice - is now the property of Amazon, their ownership resting on the absurd premise that nobody thought of that principle before it was embedded in concrete by the U.S. patent office.

Let there be no mistake about this: when you place a copyright on your own work, then unless

you are explicitly crediting external sources, you are claiming to have created every word, every idea, in your work by yourself. If I were to utter the phrase, "Plagiarism is thievery," without crediting Mr. Tipton, he, by virtue of his copyright, may now claim that I have appropriated his idea. Should I reproduce an entire paragraph, he now claims he has unique ownership over that phrasing. Well I ask: does he know this? Can he prove that each sentence in his work is unique? Much less the ideas expressed therein? On what ground, therefore, does he claim copyright? On what ground must I recognize that this expression now belongs to him and him alone?

Moreover, even though copyright was intended to protect a particular expression of an idea, as any academic scanning for plagiarized student essays will attest, the mere rewording or rephrasing of content does not count as the creation of a new work. Students the world over have tried cutting and pasting sentences, introducing grammatical errors, replacing words, reordering sentences, and a host of other techniques, in order to circumvent plagiarism restrictions, and each of these has been rejected. Well, what now, of the ownership of a string of ideas in slightly different wording? Who can say who first came up with the idea that "Many of us benefit free of charge from the ideas, suggestions, and even the rants of some of the folks on this list." Surely this is not original! The mere rephrasing of this concept does not make it the unique creation of the author.

In the creation of my daily newsletter, I read dozens of articles a day. I cannot count the number of purportedly original creations that do not lift, in whole or in part, concepts and ideas previously expressed elsewhere. Each one of these has a copyright label attached to it, as though it were some sort of unique contribution to society. If I read one more "original" explanation of XML I am tempted to scream! And then I see these articles cited as authorities, as though their authors contributed to the debate. I see the "Lego" analogy of learning objects attributed to David Wiley more times in a week than I can count, as though he came up with the idea.

Copyright may protect only the expression of an idea. But in virtually every article, every post, there is more than a little reuse even of the expressions of ideas, much less the ideas themselves. It's not that I am saying that there is nothing original under the sun. But what I am saying is that there is far less that's original than the supposed originators would like to claim. It is in my view blatantly dishonest to slap a copyright label onto anything you have written unless you are quite sure you have checked and verified the original statement of every idea in your work. For otherwise, your claim to copyright is nothing less than theft, and theft of the worst sort, for you did not even bother to acknowledge the existence of the person from whom you stole the idea.

4.

I stated above that copyright is used to protect thieves. Let me explain this a bit. The purpose of copyright is to control how the expression of some concept or idea is used. This is very clear, for example, in the terms and conditions of the trdev discussion group (and countless other forums where the same conditions are stated). Nobody is to copy, assert these terms, the posts in this group without the explicit permission of the author. Even the Creative Commons licenses contain this assumption. The idea is that the work cannot be used without adhering to the conditions stated in the license.

The purpose of copyright, then, is to prevent others from using the material. Hence the use of the word "copy" in the term. It restricts the right to make copies of the work except under the terms and conditions outlined by the author. That is why I refer to the use of copyright as protection for theft. If I express an idea, and you take that expression (modified to disguised the original

authorship), and place a copyright on it, then I can't use that idea any more, at least, not without explicit attribution, and subject to your terms and conditions.

Now quite the opposite sort of thing happens when I copy your work without permission. Even granted that your work may be your original idea (an assumption which, recall, is generally dubious), I cannot be said to have stolen anything from you. You are still in possession of your original work. You are still able to use it, reproduce it, cite it, have it cited.

Of course, what you have lost is your ability to control my use of your work. You have lost the ability to force me to pay money for it. Or to force me to acknowledge you as the sole author and originator of the work. You have lost the ability to prevent me from reproducing the work in order to criticize it. You cannot stop me from creating a parody of the work. Or even from using it as evidence to show that your work is not, in fact, original.

Many people feel this as a real loss, and hence call the unauthorized copying of a given work a type of theft. But something is a theft only if you can show that I have taken from you something that you previously had. And while it may look, from the phrasing above, that I have indeed taken something you had, you never had any of those things to begin with. They are, at best, what might be called counterfactual properties. Under certain conditions, you might have had them. But you never did have them, and under most conditions, you never would have had them.

Consider, for example, your ability to charge me money for the work. This lies near the surface of the minds of most defenders of copyright. My copying of a work is frequently represented as a substitution for paying for the work. That is how the billions of dollars "lost" income is calculated by software publishers in their endless tirades against what they call piracy (another form of "theft", but with an entirely fictitious element of force connoted by the expression). But this income is only lost if there is any circumstance in which I would have paid you. And there isn't. Had I not copied it for free, I would not have copied it at all.

This is a clear example of how unauthorized copying is not theft. If you steal a CD from a store, not only has the copy not been paid for, the store has also lost the ability to charge anyone else for that CD. That is not the case here. It is as though I had taken the CD (which I would never have purchased) and yet left the copy of the CD in the store. The store has not lost any income, because a person who would pay for the CD could come into the store, pay money, and leave with the CD.

You may argue that I may send a copy of the CD to my friend, a fiend who, in other circumstances, would have purchased the CD. That may be true, but this example only shows the dangers of relying on counterfactual properties. For now I can argue, with equal plausibility, that my sharing of a copy of the CD prompted a person who would not have purchased the CD to now go to your store and buy one. And empirically, it appears that your sales actually increase if you allow people to copy the CD. And conversely, as happened with the shutting down of Napster, if you prohibit copying, then your sales decrease.

The ethics of copying cannot be established by pointing to financial loss, because there are many cases in which my copying can produce more gain than loss. It reduces the question of ethics to a financial calculation, which isn't the point at all. And it is especially not the point when the material being distributed is being distributed for free, as on the trdev discussion list and most elsewhere on the internet.

5.

Your holding of a copyright over a certain work isn't about money at all. It is about control. You want to control my use of what you have claimed to be your work. You want to control who I show it to, if anyone. You want to control my use of the expressions or ideas for the purposes of analysis or criticism. You want to force me to quote you accurately, to ensure that I do not quote your words out of context. When I copy your work without authorization, you have lost all of this.

But where we disagree is whether you had any of this in the first place. And where I deeply disagree is in your assertion that it is somehow unethical (much less something that should be a criminal offense) for me to disrupt your control over me. Quite the contrary: I allege that it is inherently dishonest, unethical, and should be illegal, for you to assert that you can control me in any of these ways.

Take, for example, the sharing of your work with my friend. This is a right I have always had. I could play your music at my party. I could pull your book off the shelf and show it to anyone I pleased. We would all gather around my radio and listen to the evening news. You couldn't tell me who I could share this content with. Even if my friend was someone who was evil incarnate, you couldn't prevent me from doing this. But online, the equivalent of showing somebody a page of printed text is to make a copy and send it by email or to post it to a discussion list. You don't want me to do this because now other people might start talking about your work, and making comments about your work. And you can't stop them, you can't respond to their comments, you can't ensure that they are understanding what you said in the right way.

It is the epitome of a desire for control to assert that the discussion of a work must occur in only one forum. After all, isn't that the major reason why posters to trdev do not want their material copied to another list? Because people on that other list - some of whom are disliked by the original authors - might conduct an illicit discussion of the work.

But of course people have never had the right to control the discourse of others. They have never had the right to prohibit the sharing of a piece of text for common dissection, criticism, and even misinterpretation (where would we be if Kant had got Hume right?). People have never had the right to prohibit parody and derivative works. It is only in the digital era, where every form of sharing amounts to a form of copying, that people have even begun to assume that they have, and can enforce, these rights. Now the Church of Scientology stifles internal and external dissent. Now Dow Chemicals (the current owners of Union Carbide) shuts down criticisms of their actions at Bhopal.

I do not accept anyone's assertion that they have that much control over the use of their work. When I obtain some sort of content - whether it be by buying a CD, reading it on the office wall, borrowing a book from the library, or reading it on a discussion board, I do not under any circumstances give up the right to share the work with others, to comment, criticize, parody, misinterpret or do any of a hundred things the original author may find distasteful. No doubt Mr. Tipton would really prefer that I did not hold up his words as an example for all to see. But he never had the right to prevent this use, and that is the risk he took when he allowed me to view it in the first place. And it is a travesty of ethics to somehow suppose that he has not only a legal, but moral, right to control my expression in this way.

6.

There is a growing assumption on the part of software vendors and content producers to the effect that, when I access their content, I have or can in some way sign away my rights. This is the essence of what are called "shrink wrap" licenses, and the essence of the terms and conditions of the trdev discussion list, among others. The use of trdev is contingent on the "guidelines" and within those guidelines is the assertion that the deliberate violation of copyright will get a member banned.

The language used in the trdev guidelines is as fuzzy and dubious as the language used in many such shrink-wrap licenses. What counts as, for example, a violation of copyright? Are we all to be subject to U.S. copyright laws and therefore the loathsome DMCA? If someone alleges that copyright has not been violated, who makes that determination? If I maintain that copying posts to another list does not, in fact, constitute a breach of copyright, am I subject to any sort of hearing and appeals process? Does the rule of law even apply on trdev (or in similar environments), or is more along the lines of the stipulation, posted in jest, that you will be sanctioned for "saying the wrong thing when one of us coordinators is in a bad mood?"

And of course the purpose of this (and similar) statements of conditions is to assert that my use - my reading - of your content is subject strictly and solely to the list owners' discretion. There is no law: what constitutes a law is created by, interpreted by, and enforced by the list owners. There are clear restrictions - some contained in the terms of service, some enunciated in passing by list owners' posts - on what I can say and how I can say it. And if I want to offer a criticism that is beyond the bonds of what is allowed on this list, then I cannot take the discussion to another forum, for that, too, is prohibited by a wide and liberal reading of the copyright provisions.

Acceptance of the terms of service, therefore, is tantamount to my explicit recognition that I have no rights. It is an explicit abrogation of any of the freedoms I assumed I had when I conducted my affairs in the old world of print and oration. This, I am told, is the contract that I agreed to when I signed up to this (and other) lists, and for that matter, the sort of contract I agree to every time I buy a book, listen to a CD, or install some software. And the members of this list, in part, expect me not only to accept this elimination of my rights, they hold me to some sort of odd moral code in order to do so. Jack McCarty tells us that our violation of the terms of service is "evil." How did this come about? How did my assertion of my own rights become evil?

In fact, no matter what U.S. and other legislators and courts may have to say, it remains not only ethical but even morally responsible to hold and to protect my freedoms, even in the face of products and services that seek to limit these rights. My reading of the posts on this or any other list does not, by virtue of some terms of service, limit my right to restate the points contained therein, to criticize them, or to discuss them in other manners not approved by the list owner.

It is morally and ethically wrong to allow copyright to be used to stifle the freedoms we enjoy, and morally reprehensible to use copyright in an effort to stifle someone else's freedoms. But that, in the digital age, is what the application of copyright is all about.

7.

There is a response to my assertion that trdev is "a (more or less) public bulletin board."

Specifically, Will Pearce responds that "it's not at all like a public bulletin board" in that "no one has the "right" to post anything he wants or do anything he wants with others' postings--there's not even a "right" to be a member, as the list owner can toss you off any time he or she chooses." In various other posts are assertions that trdev is a private space, that the owners may therefore control a person's conduct and enforce it as necessary.

I do not deny that the owners have the power to enforce their will. They could ban me from trdev (at least until I created a fictional identity). They could moderate my posts. That is why I said "more or less" (a qualifier that was conveniently ignored by all the critics).

But I maintain my assertion that trdev is a public forum. Part of my assertion rests on the practical. As Pearce himself stated, "anyone can join." Only the most trivial and flimsy of barriers prevents me from reading the posts, a barrier so insignificant that it may as well not exist at all. The discussion board is hosted through a service on the world wide web, meaning that almost everybody with an internet connection already has the tools and means needed to access the list.

Saying that trdev (or any similar discussion board) is a private space is like saying that a poster on a wall facing a public street is a private space. Technically, it may be true, but the effect of posting a message in a place where it may be viewed by the entire world is tantamount to mounting it in a public place. You cannot place a message on a wall in public view and then claim that anything contained in the message can be read and discussed only under a set of rules and conditions established by the owner of the wall, not even if you post those rules and conditions in large text on the message itself.

There are many things a list like trdev could do to become a private space. For one thing, it could move itself from the world wide web to a much more private system. Groove, say, or even individual emails to a set of trusted friends. Many other discussions happen in this way and these discussions remain private. There is no illusion that they are public discussions because there is no chance of the public viewing them.

But of course, trdev and similar lists will not do that because nobody would join them. The advantage to a person posting on a list like trdev just is that it is a public space. Because it is so open to a large readership, posting on trdev ensures that their work will receive a large audience. Posting to trdev is just like posting a message to a wall facing a public street. The people who post to trdev take advantage of the fact that they are posting to a public place, and by their use of the internet and the web, are taking advantage of all the opportunities offered by the fact that it is a public place. But they do not want to give up the control that exists in a private place.

But it doesn't work this way. You cannot put up bulletin boards with the notice that "anyone viewing this material must refrain from talking about it to others." Anyone who tried would be laughed of the street. In the same way, a great many people on the world wide web are laughing at the idea that you can post something to a (more or less) public website and expect its contents to remain sacrosanct, the rules expressed by the author to be adhered to.

Again, this is not about me stealing your property. This is about you telling me what I can do, about you asserting your power. And even if you have the punitive weight of the moderator or the U.S. Supreme Court to back you up, the simple fact is that might does not make right and that my defense of my own liberties is at least ethically grounded as your attempt to abrogate them.

8.

My main point in this post has been to show that the relation between copyright and ethics is not nearly so clear as supposed. While it is easy to piously pronounce that people who copy online content are unethical and even evil, it is also wrong. The copyright debate is not a case of the morally right trying to maintain the defense against the morally wrong. It is a debate about what should even count as morally right or wrong.

In what I have written above, I have tried to show that the deployment of copyright has led to as much abuse and injustice as it has tried to prevent. I have tried to show that it legitimizes the theft of ideas and opinions from the common weal. I have tried to show that it incorrectly ascribes ownership to unoriginal content. I have tried to show that violating copyright is no sort of theft at all. I have tried to show how copyright is used to exercise power, to stifle criticism. I have tried to show that it is being used to stifle our freedoms. And I have tried to show that it is used in an effort to convert public spaces into private domains.

No doubt some people will read what I have written as some sort of endorsement of plagiarism. Or as some sort of advocacy of the idea that all content should be free. I am not making either point here.

There is something dishonest about taking some words or ideas and passing them off as your own. But we need to be clear about the ethics of this sort of misrepresentation. This is not some sort of theft from the original author of the idea, because the original author has not lost anything (indeed, they may be dead and by definition cannot have lost anything). No, plagiarism is a breach of trust between the plagiarizer and the reader of the plagiarized work. It is a misrepresentation of one's self as something one is not.

A person who plagiarizes cannot be trusted. That is the beginning and the end of it. What he plagiarizer said (or inferred) is true, is not. In certain circumstances, such as affidavits and financial reporting, laws and sanctions are required to enforce honesty. In other cases, such as academic misrepresentation, lesser sanctions are imposed. But in general our reaction to instances of dishonesty is a community-wide condemnation of the individual in question. No further penalty is applied because no further penalty is needed.

Nor am I saying that all content should be free. Nothing in what I have said implies that no person should ever sell content. My objection to the design and use of copyright isn't based on the idea that people should not sell content, it is based on my objection to the manner in which the sale of very similar (and sometimes more original) content is prohibited, and in its use to impose illegitimate terms and conditions on the sale of content.

Indeed, many business models involving the sale of content are possible even in cases where copyright is not imposed. As companies such as Red Hat have shown, it is possible to sell content you don't even own. Moreover, the distribution of content at low cost or for nothing is often seen as a means of establishing credentials and landing contracts for service (that's why those many private consultants on trdev are so willing to give their stuff away). Content can be sold if it is offered in a more convenient format, if it is distributed to a more convenient time and place.

The purpose of copyright is merely to establish a monopoly over certain kinds of content, a monopoly over some piece of software, some piece of music or art, some piece of writing. The purpose of copyright is therefore, in all cases in which it is applied, to prohibit the sale of content. But just as in other areas of endeavor we have learned that a monopoly is not the only viable business model, so also with regard to the sale of content monopoly is once again not necessarily

the only viable model.

9.

I would like to conclude by considering one more objection. This objection is essentially the assertion that unless creative content is protected by copyright, people will not produce original content.

As Gary Lear wrote, "What will happen if we allowed people to take other's words and do what they wanted is that people who have great ideas will cease to share. Conversations will stagnate, and those who are not creative will not be able to generate any new ideas. Those who are creative will also end up cutting themselves off from those who might stimulate their very creativity."

Quite the opposite is the case. The more restrictive a copyright regime one works under, the less likely you are to share your own ideas, and even more to the point, the less likely you are to seek out and use the ideas of others.

The former is the case because, if you share your ideas, you leave yourself open to the possibility that someone may appropriate the essence of those ideas, or use those ideas as a starting point, to develop and control a product or idea you could have developed in time. You are therefore risking being cut off from the fruits of your own labour.

IBM, for example, has a patent application, filed on December 12 (United States Patent Application 20020188607), of a system "for providing multi-user electronic calendaring and scheduling functions." What it essentially involves is the use of a system very similar to a learning object repository to provide access to live events in just the way you would provide access to learning objects. Now this is an idea I have talked about in my papers and presentations for the last twelve months. Did IBM get its idea from me? Who can know. Should I have kept my big mouth shut? Probably.

The fact that IBM can, by dint of its lawyers and financial strength, appropriate and say that it invented an idea which is, on the face of it, obvious, tells me that any discourse of anything genuinely new in the public sphere is inherently dangerous. It forces me to rethink whether I should post anything on the internet at all. Certainly, if I had run to the patent office instead of writing papers and sharing ideas, then I - and not IBM - would own that idea.

The latter is also the case. This is clearest in the area of music publishing, where recording artists are very clear about their refusal to listen to song proposals. Were they to listen to the song, then they leave themselves open to the allegation that they stole the song in question, or at the very least, were influenced. Thus we get cases like the suit against George Harrison who, it was held, copied his song "My Sweet Lord" from the Chiffons's hit, "He's So Fine." It is a wise (but creatively stifled) musician who does not listen to any music at all!

10.

People forget that the periods of true innovation and creativity through history were those periods when copyright and the ownership of ideas was at its minimum, and that long periods of stagnation occurred when arts and crafts were the exclusive domain of restricted castes or guilds.

Certainly, legislators in the United States realized this in the 1800s when they refused to enforce Charles Dickens's copyright. This, of course, was at a time when London and Paris were the cultural centers of the world and Los Angeles was a backwater. Even at the relatively late date of 1928, it was permissible for a then young Walt Disney to copy not only the appearance, but even the music, from Steamboat Bill (released that same year) to create what would become his icon, Mickey Mouse.

When people like Plato can copy freely and build upon the work of people like Socrates, creativity and new ideas flourish. But when the copying and creation of new work is rigidly controlled, as in the middle ages, creativity and innovation is stifled.

The suggestion that people will not create new products, content or services if they are not protected by copyright is a myth. Nobody owns the rights to apple pies, but I can buy them in any store in the world. The patent does not exist that would prevent me from cooking my own hamburger, but McDonalds is one of the largest hamburger vendors today.

Nobody is being paid through royalties or other protections for their work on Apache (the world's most popular web server), Linux, Perl or Free-BSD. Nobody is paying the hundreds of thousands of individual weblog or website authors. Nobody paid me to create "Stephen's Guide to the Logical Fallacies," "The Future of Online Learning," or this very post. But I did it anyways.

As Mark Pilgrim writes, people create because they can't not create. They are motivated not by some external reward but through some sense of internal satisfaction.

It is, indeed, only when this process of creation by people with a genuine need to create is corrupted by the needs and prohibitions of commercialized, royalty-driven commerce that we see lurches and interruptions in the steady stream of creativity provided by people around the world. Only when we see creativity motivated by the dollar rather than the joy do we see a needless proliferation of copies and knock-offs. If there were no need to sell a thousand copies, would we really see a magazine print a half-rate description of XML rather than referring readers to better written and more authoritative accounts already available on the web?

If the objectives of those who defend copyright were really to stimulate creativity rather than monopoly and control, they would throw off the fetters of intellectual property legislation and embrace the opportunities a genuinely free market of ideas would provide. But they are not willing to do so. And so, we all lose.

References

[NewsTrolls References on Copyright and Patents](#) - more than 300 items

[Stephen's Web References on Copyright and Patents from an educational point of view](#), 255 items.

Paying for Learning Objects in a Distributed Repository Model

James M. Nugent wrote, "I concede, though, that if one could come up with a model that would allow for fair compensation for RLO creation using the Web accessibility model, then the need for RLO libraries everywhere would not exist, and in fact would be a waste of money if RLOs were that easily obtainable."

Right. Please allow me a few paragraphs to explain how this will work in a distributed learning object repository model (notice that I say "will" work - this is how it's going to happen).

Let us begin with a view of the world of learning objects - or learning resources generally, since I don't want to be pegged into someone's narrow definition - as a set of distributed resources, stored on provider web servers and distributed using many of the same mechanisms as web pages (or any other online resource, like PDFs, MS Word documents, streaming media, chat rooms and discussion boards...)

Let us also assume that there is a reliable mechanism (which I describe elsewhere) for locating these learning objects, that a metadata-enabled 'Google' and 'Alta Vista' of learning objects exists, and that instructors and developers can locate precise lists of learning objects for very specific purposes.

There then remain three problems facing the creation of a "model that would allow for fair compensation" for the use of learning resources:

1. How to ask for payment (and to specify use conditions)
2. How to actually make the payment, and
3. How to make delivery of the learning resource contingent on the payment.

Let us look at each of these in turn:

1. How to ask for payment (and to specify use conditions)

On the world wide web, there is no means to ask for payment, at least, no means to ask for payment for a specific resource without a long and cumbersome procedure. This is why most fee based web sites ask you sign up for a subscription that will allow you access to all their contents. And in those cases where you can access single articles, a ridiculous charge (five dollars for a newspaper article, thirty dollars for a journal article) is imposed (and you still have to go through the process of entering your credit card information).

In the world of metadata, however, we can make this much simpler, since every learning resource has its own metadata (and indeed is located using this metadata).

So, suppose you are a learning resource provider and you wish to charge for your learning resource (and perhaps impose other conditions, such as an expiry date for use, print rights, et cetera).

In your learning object metadata you create a bit of metadata referring to what may be called a

DRM model. Like this:

Top of Form

```
<title>Blah Blah</title>
<author>Joe cool</author>
<drm>
<broker>http://w w w .somebroker.com</broker>
<model>Easy page One</model>
<drm>
```

Bottom of Form

The broker is an organization that specializes in selling learning resources. Larger agencies may act as their own brokers. Small and poor learning resource providers (like me, acting as an independent provider) would contract stand-alone brokers.

The broker provides a set of DRM models stored as metadata on its website. The 'Easy page One' specified in the example above is one such model. Essentially, this model is an XML file specifying a set of rights and conditions, including the cost to use this resource. The model metadata may look (in part) like this:

Top of Form

```
<model>
<name>Easy page One</name>
<price>
<amount>0.75</amount>
<units>USD</units>
</price>
<print>Yes</print>
<copy>No</copy>
...
</model>
```

Bottom of Form

(Please note that all metadata in this post is simplified for the purposes of explanation)

A variety of schemas already exists for the creation of metadata files describing digital rights. There is, for example, XrML, a rights management language sponsored by OASIS. There is ODRL, an open digital rights markup language. The IEEE-LTSC is working on a rights model specific to educational purposes.

Links:

XrML: <http://www.xrml.org/>

ODRL: <http://odrl.net/>

IEEE-LTSC: <http://xml.coverpages.org/DREL-DraftREL.pdf>

It is worth noting that something like this is very much the model being adopted by the Creative Commons project. The purpose of Creative Commons is to provide an easy mechanism to allow people to share their online content for free. A variety of options exists: a content provider may wish to allow or disallow commercial use, a provider may wish to require or not require attribution, et cetera.

Creative Commons has created a set of template licenses, one to describe each possible combination of licenses for free content distribution. In order to use one of these licenses, a provider of web content needs merely to link to the appropriate license on their web page. A potential user then accesses the license and decides whether or not their use is allowed by the conditions in the license.

Link:

Creative Commons: <http://www.creativecommons.org/>

To add to this: Creative Commons also provides a licensing wizard that allows a content provider to make a set of selections (using an easy forms-based menu). Once the selections are made, Creative Commons automatically generates the (HTML) code required in order to apply a certain sort of license. This means that content providers do not actually need to know anything about the code describing the license; they simply cut and paste from the code provided.

This sort of mechanism is easily applied to XML. Moreover, since the wizard is available online, this sort of mechanism may easily be provided via a web service into a content creation tool. This allows the entire process of creating appropriate licensing metadata to be automated, making it a trivial task for content developers.

The major advantage of using third parties to supply metadata licensing will be evident below. But for now, some advantages are already clear. First, it means that content providers are not tied to any particular rights management schema. This is important to allow compatibility between commercial and non-commercial providers.

For example, some rights management languages may require the payment of a royalty for use. This was one of the major fears about XrML, which was developed by a private company (Content Guard). Requiring the payment of a royalty would make it much more difficult to provide learning resources at low cost or for free, and so a system that depended on one sort of rights markup language would effectively split the market into two.

The use of rights management models (rather than, say, embedding rights management information into learning object metadata) becomes apparent when the task of changing licensing conditions comes up. In order to raise (or lower) a price, for example, only a single file need be edited, as opposed to the metadata for every learning resource provided.

2. How to actually make the payment

The next step of the process occurs when a learning object is presented for consideration for use.

When some material is actually selected, then (if required) the payment mechanism should kick in and facilitate the transaction.

A brief consideration of the payment mechanism shows that this is a complex process, one that has never been solved to anyone's satisfaction. The usual method at this point is to present the user with a credit card screen, a process that becomes tiresome very quickly. Alternative mechanisms require the presentation of a password, licensing information, and even IP authentication (sometimes via a proxy server).

A variety of approaches are possible here, but the approach that will eventually be adopted is the one that provides several key features for potential users:

- Control over the presentation of options
- Trust in the payment mechanism
- Ease of making payment
- For the content provider, several other requirements come into play:
- Actual receipt of payment in real time
- Trust that the copyright conditions will be observed

Additionally, various stakeholders have a number of ancillary interests. Such stakeholders could include school boards or ministries of education, employers, professional associations, parents, and other service providers. These stakeholders want mechanisms to:

- Influence the selection of resources for selection
- Pay for resources on behalf of users via licenses or subscriptions
- Track the use of learning resources

Consideration of the requirements posed by these groups leads us to the following set of steps involved in actually paying for learning objects:

- A. Presentation of a list of resources
- B. Selection of a resource and retrieval of digital rights information
- C. Generation of a request for the learning resource
- D. Granting of the request for the learning resource

Let's look at each of these in turn.

A. Presentation of a list of resources

i. Via Search Results

The first step in the process is the presentation of a list of resources for the user's consideration. This presentation can occur in a variety of ways. The prototypical mechanism exists when the user conducts a search from a metadata repository (the 'Google' of learning objects) and is presented with a series of results.

In such a situation, the user generates a search request to the metadata repository. The search request may specify the usual parameters, such as the topic under consideration, the granularity of the object being sought, or the format or medium under consideration.

From a digital rights point of view, the user should also be able to specify the rights models that will be acceptable. For example, if the person is cheap (like me) then they will not want to view any object that requires a payment. Or perhaps a person is willing to accept a payment, but only up to a certain amount.

Because the digital right model is specified in the learning resource metadata, it is easy for the metadata repository to learn the conditions associated with each learning resource in its index. It is thus easy for the metadata repository to filter the list of resources provided according to the rights management conditions placed in the search.

Typically the user would store these conditions as part of a default set of parameters designed to accompany any search. This default set would either be attached automatically or selected en masse via the selection of a profile (eg., 'at work' versus 'at home'). Typically, the user would identify only the topic desired (either via a keyword, search string, or predefined classification schema obtained using a web service). The remaining parameters - age level, modality, rights management, et cetera - would be added to the search request automatically.

It is at this point that third party stipulations would be incorporated into the search. Depending on the profile selected, an employer's recommendations may be added. The employer may limit the selection to a specific list of providers (for which it has content licenses, say, or for which it has granted accreditation).

In order to make such a mechanism work, a variety of systems need to be in place. I will address the major components in turn.

a. User Profiles

A given user needs to have a predefined profile containing relevant information. The user profile is stored as a metadata file and contains the usual information (name, address, age) along with the data required to enable the search process.

Various user profile metadata schemas already exist. Microsoft's Passport, for example, stores user metadata according to a 'Passport Profile Schema' (which, unfortunately, doesn't appear to be available for general viewing). A variety of different approaches may be found by searching on Google for personal.xsd.

Link:

<http://cml.sourceforge.net/schema/STMML/EXAMPLES/PERSONAL.XSD>

Today, user profiles have been associated with specific applications or services. While this trend may continue for the short-term, over the long term we should expect to see the provision of personal profile services on the web. This allows users to create and use a vendor-neutral (and institution-neutral) description of themselves.

Inside the personal profile are various sub-profiles, indicating different contexts of use. For example, a person's personal profile may specify different attributes while 'at work' or 'at home':

Top of Form

```
<personal profile>
<name>Stephen Dow nes</name>
<phone>none</phone>
<subprofiles>
<subprofile>
<name>At Work</a>
<address>55 Crow ley Farm Road</address>
...
</subprofile>
<subprofile>
<name>At Home</name>
<address>...</address>
<subprofile>
</subprofile>
</personal>
```

Bottom of Form

Within the personal profile is the search information to be sent to the metadata repository. Additionally, within each subprofile is additional search information.

Top of Form

```
<subprofile>
...
<lor search>
<third party>
<source>http://bigcompany.com/learning</source>
<model>Grade III Mechanic</model>
</third>
</lor>
...
```

Bottom of Form

Just as in the case of rights management (described above), the reference is to a metadata file stored on the employer's website. This metadata file contains a list of recommendations and permissions to be applied during the search for learning resources. Just so, a set of recommendations and permissions could be specified by school boards, parents, educational funders and other third parties.

b. Profile Servers

A user profile server is a stand-alone application that releases bits of a person's user profile to external service on request and according to user-specified permissions. Several different models exist.

One alternative is to have a computer-based profile server. The personal profile is stored on the

user's computer. It is added to by means of profile wizards and also as a consequence of program output (for example, when you install ICQ, it may seek to add your ICQ number to your personal profile). When computer programs and web services request profile information, then the information is released according to a set of rules (including allowing everyone to see some things, requiring a popup permission to be displayed for others, and refusing ever to allow still other information to be released).

The weakness of this approach is that it is specific to a specific computer. Thus, a person who (like the vast majority of us) uses more than one computer would find this approach unsatisfactory.

A second alternative is to place profiles on service providers' computers. This is in fact what happens in most cases today. At each service a person uses (the government, a university, Amazon.Com, Microsoft Passport) a separate profile is created. This profile may be accessed by entering a password.

The problem with this approach is that for each new service a person uses, a separate profile must be created. This makes updating profiles an impossible task, leading to misinformation in separate profiles. Additionally, the information (with some exceptions provided by Passport or Shibboleth) is not portable.

An even larger problem exists with control over the personal information provided. Though online service providers frequently promise never to share personal information, the volume of email spam proves that such promises are hollow. Moreover, control (and even ownership) of the information lies in the hands of the service provider.

The third alternative is preferred: the development of stand-alone profile management services that act as a broker for personal information on the internet. Because many such services exist, a person can choose a local and trusted broker (one they can sue if things go wrong). Because such services are working on behalf of the user (and may be paid for by the user, though no doubt free brokers will exist as a public service) there is no vested interest in ownership of the information: it is to the broker's advantage to ensure that the user owns his or her information.

A stand-alone personal information broker may also provide the security of information third parties often require. 'Read-only' information, such as grade transcripts, certifications, and the like, may be accepted (with the user's permission) by stand-alone brokers. Thus, these stand-alone brokers may be trusted not only by the user, but also by third party applications seeking to obtain information.

Links: I can find almost nothing on this, except for: Microsoft Passport:

<http://www.microsoft.com/net/services/passport/>

Shibboleth: <http://shibboleth.internet2.edu/>

c. Creating and Sending the Search Request

The search tool employed by the user (either a specialized learning objects browser (LOB) resident on the user's desktop, or a service available online (such as a learning content management system), now gathers the search information. It may obtain search parameters from:

- the search request form filled out by the user

- the user's personal profile (with subprofile specified)
- third parties specified in the user's profile

This information is parse by the search tool and organized into a search request format. The search is conducted using XQuery and SOAP. This process is already well documented by the IMS consortium Digital Repositories Specification.

Link:

XQuery: <http://www.w3.org/TR/xquery/>

SOAP: <http://www.w3.org/TR/SOAP/>

IMS Digital Repositories Specification: <http://www.imsproject.org/digitalrepositories/index.cfm>

ii. Via Content Packages

Most accounts of online learning do not depict students searching for and retrieving a set of educational materials. Rather, they envision the creation of sets of prepackaged materials (structured, for example, into lessons and courses). This approach supposes that the searching, relevant annotation, and organizing has already been accomplished by an instructional designer or teacher (using much the same process as just described above).

Various accounts of learning content packaging exist. IMS, for example, described a package of learning objects using a manifest, an XML document describing the contents and organization of learning resources in the package. The IMS Simple Sequencing model can work with a manifest to control the display of learning resources according to input, test results, or other variable parameters. At a more tightly defined level of granularity, the Educational Modeling Language (EML) EML describes not just the content of a unit of study but also the roles, relations, interactions and activities of students and teachers.

Links: IMS Content Packaging Information Model: <http://www.imsglobal.org/content/packaging/cpinfo10.html>

IMS Simple Sequencing Information and Behavior Model:

http://www.imsglobal.org/simplesequencing/v1p0pd/imsss_infov1p0pd.html

EML: <http://eml.ou.nl/>

However the organization of the learning material is defined, whether by means of search results (described above) or via an intermediary mechanism as described in this section, there comes a point where the learning resource itself is presented to the user.

In many descriptions, when this moment occurs, the learning resource is already resident either in the student's computer (perhaps on a CD-ROM) or in the learning content management system. This presupposes that all DRM matters have been attended to: that the object has been licensed and paid for and made available for use. Thus the IMS Content Packaging Information Model explicitly allows for the location of "physical files" within the manifest.

On the model being described here, however, what has been obtained thus far is nothing more than a reference to the learning resource, and not the learning resource itself. Thus, manifests employed in the present system would not contain physical files (though they could be nearby, via a caching mechanism, should bandwidth be an issue).

Importantly, the learning resource has not necessarily been bought and paid for. Though prepayment and pre-licensing is an option, it is not a requirement. It is therefore possible for an instructor or an instructional designer to create and deliver a package of learning materials without having spent one minute obtaining rights and clearance.

This is a significant matter. As MIT's Jon Paul Potts admitted during a recent interview about their Open Courseware Project, the single largest expense was in the organization and acquisition of digital rights before placing course materials online.

Link:

Technology Source Interview: http://ull.horizonlive.com/launcher.cgi?channel=tsdownes1202_2002_1205_1404_20

A better example of this sort of approach is provided by XanEdu's Coursepack service. XanEdu allows teachers to login and view all learning content without charge. It also provides a wizard-like service to allow instructors to select learning resources for inclusion into a single resource called a webpack. On reading the coursepack, the student reads the instructor's annotations and is provided with links to the learning resource.

XanEdu's model requires that students create individual accounts with the service. When the student selects the resource for viewing, access to the resource is granted only to students with accounts. Each item added to the coursepack is priced individually, and the student is charged only for the materials accessed. The learning resource resides on XanEdu's server throughout this process, delivered to the student only at the time of request.

Link:

XanEdu Coursepacks: <http://www.xanedu.com/coursepacks/>

No matter how the list of resources is obtained - whether it be via a search process, a manifest, a sequencing mechanism or a course pack - the process is the same. A list of resource metadata, in XML, is presented to the viewing device. Then the viewing device interprets this list, either providing a set of links on which the learner may click, or automatically invoking a request for the learning resource.

The viewing device may be a stand-alone learning object browser. It may be a learning management system the student accesses via the web. It may be processed and sent as an email message providing a list of links. The resource itself - no matter what viewing device is used - remains on the provider's web server until a specific request is generated.

C. Generation of a request for the learning resource

On the world wide web, generating a request for a learning resource is straightforward. The resource is specified in a URL. The URL contains the location of the remote server and the file name for the specific resource. A connection is opened to the remote server and a request (HTTP-GET) is sent for the specific file. If the file exists and access is allowed, the server sends the file in response to the request. Then the connection is closed.

The problem with this mechanism is that there is no method for the payment for a given resource. Payment must be arranged through a separate transaction, and then that transaction must be authenticated (for example, by submitting a password) at the time of request. What is needed, therefore, is a means of combining the payment, authentication, and request for a resource.

In order to accomplish this, the device making the request must do the following:

- determine whether a payment is required
- enable a decision as to whether to approve the payment
- make the payment
- obtain the authentication needed to access the resource

i. Determination of whether a payment is required

Recall from above that the learning resource provider encoded a reference to a rights model in the learning resource metadata. This information may have been used in the search process. The reference is now available to the viewing device. Either the reference was included in the information contained in the original request, or it must be obtained via a request for the full learning resource metadata.

The viewing device is now able to determine whether a payment is required. Several possibilities exist:

there may be no rights metadata, in which case the server may assume no payment is required

the rights metadata may point to a service such as Creative Commons, in which case it may assume that no payment is required

the rights metadata may refer to some other rights management service, in which case it needs more information

ii. Decision as to whether to approve the payment

If more information is required, the viewing device's next action is to retrieve the rights model from the rights broker. It is presented with the model, which it parses and extracts (minimally) the price (and unit of currency). It then compares this information to the information in the user profile and determines whether to:

- authorize payment automatically
- provide a yes/no option to opt for payment
- reject the request and send an error message

The third option is annoying, which is why it is important to filter such requests in the search process. The second option is also annoying, and should be used only to flag extreme cases (such as when an individual item cost breaks a threshold, or when total spending crosses a threshold).

Whether the first option (automatic payment) is the case, or whether the user selects 'yes' for the second option, at this point a payment must be made.

Typically at this point credit card, subscription or license information would be sent to the resource provider. However, this is an approach fraught with pitfalls:

- it requires that the viewing device be able to send any combination (and only the correct combination) of licensing, subscription or credit card information
- and do it securely
- it requires that the resource provider be able to process such information
- and do it securely, in such a way that the user trusts the service provider

Making the Payment

We have already seen (above) where a learning resource provider relies on a third party to manage rights models metadata.

It is already common on the world wide web for service providers to contract third parties to receive payments on their behalf as well. Examples of such services include Cardservice, PSIGate, WorldPay, and more. Such services (for a price) minimize the overhead required for an online merchant to set up shop.

Links:

Cardservice: <http://www.cardservice.com/>

PSIGate: <http://www.bluegenesis.com/psigate.html>

WorldPay: <http://www.worldpay.com/>

Payment Gateways: <http://www.multiactive.com/solutions/ecbuilder/gateway.html>

Such services, however, do not provide a wide range of options for the purchaser. What is needed is an analogous service, one that represents the purchaser, and which makes payments to the content provider (or content provider's broker) on his or her behalf.

The purchaser broker is a service very similar to the personal profile management service (it may even be the same service).

The location of the purchaser broker is contained in the personal profile and is made available to the viewing device. When a payment is required, the viewing device sends a request to the purchaser broker. This request is a simple metadata document containing the rights management information contained in the learning resource metadata and the user's purchaser broker information as obtained from the personal profile.

The purchaser broker maintains an account on behalf of the purchaser (much like a bank account or credit account). The purchasing agent also manages subscriptions or licenses for the purchaser. When the purchaser broker receives a request, it:

- compares the request to licenses and subscriptions
- compares the request to conditions specified in the personal profile
- scans for anomalous requests

If a cash transaction or authentication is required, the purchaser broker sends the required information to the provider broker. This transaction is executed over a secure network. The

provider broker then sends back the authentication required for access to the learning material, which is in turn passed to the learning resource viewer.

iv. Obtaining Authorization

When a provider broker receives a request along with payment or license verification, it returns a key for access to the learning resource. The vendor broker may keep keys locally, or if greater security is required, it may request the vendor for a daily rotating key. This key is sent as a response to the purchaser broker and in turn passed to the viewer.

3. How to make delivery of the learning resource contingent on the payment

The viewer, key in hand, now sends a request (it could be as simple as an HTTP-GET request) to the learning resource provider. The key is provided as part of the request. If the key is correct, the resource is delivered to the viewer for viewing. If the key is incorrect, an error is returned.

The security mechanism can be as simple as an .htaccess with a password. What is significant here is that even though the protection may be simple, paying for access through a Purchaser Broker is a much simpler and cost-effective means of obtaining the resource than any other (non-legal) method.

Link:

.htaccess: http://www.webdeveloper.com/servers/servers_htaccess_magic.html

Some resource providers, fearful that their resources may be copied and sent to third parties, may also elect to lock the document itself. This capability already exists for some document formats, such as Adobe's PDF format. Alternatively, content providers may wish to ship a locked viewer with the object. Once again, the key provided by the Provider Broker may unlock the document or document viewer.

Link:

Adobe 5.0: <http://www.adobe.com/products/acrobat/pdfs/acroov.pdf>

4. What Needs to Be Done

It seems to me that much more attention has been paid by the content industry toward preventing illegal access to online resources than to enabling legal access. But so long as the industry's focus is on security rather than sales, it will continue to founder.

Moreover, it also seems to me that what attention is being paid to content distribution on the web is being paid with an eye to being the sole (or "exclusively licensed") distributor of content to closed (read: academic) markets. But so long as more attention is paid to cornering the market rather than to building one, once again, the industry will continue to founder.

Most - if not all - of the knowledge needed to implement a learning content marketplace already exists. True, the description above is a bit fuzzy in places. How, for example, would a purchaser agent manage licenses? How, precisely, would a key open a locked document? But these are

questions with answer, and many of the answers have already been developed. So: what needs to be done?

A. A Content Distribution Network

Part of the problem is that, aside from the world wide web, we do not have a content distribution network at all. We have points of access, such as the resource libraries hosted by traditional publishers. But these do not reach out to the wider market, and are so limiting in their access as to make them useless for educational purposes.

So we must first build the content network. We must build a network of learning resource providers who make their resource metadata available for harvesting. The model is in place: the OAI initiative provides tools and software to make this possible.

Link:

OAI: <http://www.openarchives.org/>

We also need metadata harvesters to aggregate this information and make it available for searching. Thus far, no such harvester exists: the only metadata repositories we have today depend on forms-based submission and lock their content away from prying eyes. But there are examples elsewhere: the RSS community has provided us with a great model for content harvesting and indexing.

Link:

RSS for Educational Developers: http://www.downes.ca/files/RSS_Educ.doc

Finally, we need learning content management systems and learning object browsers that look beyond their own internal repositories to search for learning resources. More than providing an interlibrary search, these systems should access proper metadata indexing services in order to locate learning materials for use in online courses, and then to be able to retrieve those resources for viewing.

These elements are coming. Indeed, they will be here faster than you think (though it may be a while before the large LCMS vendors cave and provide access to the wider marketplace).

B. The DRM Substructure

Once the content distribution network is in place, providing the DRM layer is almost trivial.

At the resource provider end, only one small tool is needed: a service that provides a key when presented with a proper request from a Provider Broker.

At the learning object viewer end, we need a mechanism that will make a request when presented with rights metadata stipulating that payment is required.

Finally, we need the two key players: the Purchaser Broker, and the Provider Broker. Instances of the services provided by these brokers already exist on the web. Payment processing agents

already exist. And purchasing agents, while not deployed yet, exist in bits and pieces across the internet.

Nobody has shown any inclination to build such tools and make them available to anyone who wants to become a Purchaser or Provider Agent. Partially this is because they have seen no need - why create software for a network that doesn't exist? But partially it has also been greed: the people who have created these tools also intend to capture most or all of the commerce on the internet.

But it's not going to happen that way. It's not going to happen because nobody has a monopoly on sending and collecting money over the internet. It is - Microsoft to the contrary notwithstanding - not possible to create such a monopoly. Because even while it may be possible to have the only transaction system, it is impossible to close the door on the other alternatives: either the refusal of the population to conduct online transactions at all, or the redirection of such transactions to questionable or illegal underground services.

The Aeffability of Knowledge Management

1. The Autism of Knowledge Management

Patrick Lambe is concerned about the "obsessive fascination with the idea of knowledge as content, as object, and as manipulable artefact" (Lambe, 2002) he feels is manifest by certain proponents of "object oriented knowledge and learning management". This fascination, he suggests, stems from an artificial separation between content and connectivity. It manifests a "disregard for the unique contexts" in which meaning is constructed. Knowledge, when viewed as an object, is separated from the context in which it may be applied, as instantiated by human interactions.

Lambe's thesis is bolstered with observations and criticisms regarding the origin of this view. Knowledge management, along with associated technologies, such as the use of learning objects, have their origin in a desire to automate and industrialize the process of teaching and learning. Quoting yates, he depicts the process as a depersonalization of content, the removal of "individual idiosyncrasy... memory... and skills" with systemic, organization-based, analogues. (Yates, 1989). The result, he argues, is "a view of the organization as a machine" and knowledge, therefore, as objects manipulated by that machine.

It is hard to resist this comparison. Writers about knowledge management and learning objects explicitly use the terminology associated with industrialization. Lambe quotes Gibbons, et.al. (2002), "The instructional object – indexed by metadata – has great potential as a common building block..." As Friesen (2003) notes, diagrams depicting the model of learning objects used by such agencies as Advanced Distributed Learning actually contain pictures of gears. The criticism, "That there is a qualitative difference between the process of steelmaking and learning as a human experience laden as it is with emotive colouring, and nested in an intricate, ever-changing web of relationships, is not noticed, or it is ignored," is oft-repeated throughout Lambe's essay.

"Our point here is not a moral one, however, but a logical one. Approaching the use, acquisition, creation and adaptation of knowledge as if it is primarily a mechanical exercise that manipulates and processes stuff, akin to a blast furnace, is a category mistake. The analogies don't wash, because knowledge itself does not behave like physical stuff, and we only partially behave around knowledge as if it is stuff. The word "knowledge" is a noun, only because we make it so, not because it is a thing to be manhandled."

It is on this observation that his argument will stand or fall.

2. Objects, Reusability and Universality

The term "category mistake" was coined by philosopher Gilbert Ryle (1949) in order to refute the thesis that there is a distinction between mind and matter. Searching for 'mind', argued Ryle, is akin to searching for 'school spirit' and expecting it to be found somewhere among the buildings, grounds and students at a university. 'School spirit', like mind, does not have a separate existence, and it is thus inappropriate to treat it as though it did. 'School spirit' is rather, as some later writers would say, an emergent (or 'supervenient') phenomenon arising from the interactions of students among themselves.

Lambe's argument, then, is that knowledge management and learning object designers are treating knowledge as though it were like the bricks and mortar of a university. But knowledge, he responds, is more like school spirit. Though it may depend on the arrangements and behaviours of various physical objects, such as people or states of affairs in the world, it is not the same as them. Knowledge, rather, is more like school spirit, and (marketers aside) the idea that you could capture, package and distribute school spirit is absurd.

Indeed, one of the major ways an emergent phenomenon differs from a physical object, as Lambe recognizes, is that it needs to be recognized in order to exist. The pixels arranged on a computer screen are physical objects; that together they form an image of my cat is an emergent phenomenon. But the pixels can be said to form an image of my cat only if there is a perceiver to recognize them as such. The property of 'being a picture of my cat' is not inherent in the pixels, not even in the organization of the pixels. Recognition of the emergent property as such requires a host of background assumptions: that there are cats, that they have certain distinct appearances, that this picture resembles my cat, of which I have had prior experiences.

Thus Lambe writes, "All learning has context, and it has historicity. In both dimensions, in its context and its historicity, knowledge is imbued with meaning and emotion far beyond its informational content, and it is netted in a social understanding of the world. It is layered in time, overlaid, often obscured and sometimes revived and resurfaced, to take on fresh shades of significance. It has a past and a future. It means different things to different people. Knowledge as we use it is organic and contiguous to our existence as continuous, conscious and social identities."

The bulk of Lambe's paper is devoted to exploring particular ways in which knowledge does not resemble physical objects, and specifically, the idea that knowledge (and hence, a learning object) is reusable, the idea that it can be used anywhere, the idea that one bit of knowledge can be exchanged for another. These are properties that various writers have been found to be essential to learning objects. Friesen (2001), for example, writes that learning (or educational) objects must be discoverable, interoperable and modular, which together allow them to be reusable and interchangeable.

But knowledge is not reusable, argues Lambe. Even physical objects are not reusable, except at a "skin deep" level. The attraction we have for an orange jump-suit obtained from NASA, for example, may be very different from the attraction we have for an orange jump-suit from a prison compound. Only one of these would be worth wearing around the house, and this selection depends on our recognition of the history and meaning of the one over the other.

Nor is knowledge universally applicable. While a given brick may be used in any wall at any time, the applicability of knowledge is much more limited. Knowing how to drive on a freeway, knowing how to interpret Morse code: these are bits of knowledge that are more or less usable over time. The usability of a given bit of knowledge also varies according to place. "Our knowledge needs differ depending on who, where and when we are." What we need to know varies from domain to domain. "There is no such thing as universally applicable knowledge, and this is why the market for the localisation of instruction manuals, software and e-learning has blossomed in recent years."

In the same way, and by the same reasoning, bits of knowledge are not interchangeable. While it may be possible to remove one brick and replace it with another, it is not possible to do the same with knowledge. Understanding how to fix a photocopier, for example, depends on the unique

circumstances of the given machine, and so knowledge about how one machine cannot be applied to the diagnosis and repair of another machine. "Understanding the science, and being able to label and replace components does little to resolve problems that arise from social and human initiatives and changes."

3. Applying Knowledge

There is much that is true in Lambe's observations, and this gives his overall argument a plausibility and intuitive acceptability. It is true, for example, that knowledge is an emergent phenomenon; there aren't bits of knowledge out in the world that can be harvested like apples and beans. Just as seeing a picture on a computer screen requires that a perceiver detect, and recognize, a pattern of pixels, so also does knowledge require that a knower look at the world, detect, and recognize, a pattern of phenomena.

The history of knowledge is replete with debates regarding how a knower, or a community of knowers, can detect such patterns, what will count as a pattern, whether a pattern is genuine or merely a spurious observation, whether the pattern represents (or is) an underlying reality. But nobody - nobody, not even Lambe, if he would reflect on this - believes that the knowledge we thus obtain is not reusable. The very act of it being knowledge, the very fact of being a pattern, makes it in one way or another abstract, and if something is abstracted, even a little, then it can be applied to two or more unique circumstances, and is therefore reusable.

Consider one bit of knowledge, the knowledge that $2+2=4$. This is a pattern that can be extracted by observing the behaviour of groups of objects in the world. (Kitcher, 1983) As it turns out, it is a part of a wider, inter-related, set of patterns we refer to in the aggregate as 'addition' or 'mathematics'. The usefulness of mathematics is derived from its wide applicability. It turns out that every time we aggregate two objects, and conjoin them with a similar aggregation of two objects, the result is four objects. This particular principle is used in a wide range of domains, from engineering to economics to baseball. The knowledge that $2+2=4$ is most definitely reusable; indeed, it would be of little interest to us (much less denoted a type of 'knowledge') were it not.

The knowledge that $2+2=4$ is also interchangeable. Because there are many bits of knowledge (by definition, an infinite number of bits), and because no human (save, perhaps, someone who is autistic) can remember them all, these knowledge bits are codified and stored in various devices. In my youth they were encoded on bits of paper in tables called 'addition tables' and 'multiplication tables'. More complex calculations are encoded on a device in my office called a slide rule. When I went to college in 1980 I obtained my first electronic encoding, a calculator. Today such devices are common and we see in stores everywhere both mechanical and electronic storage devices called cash registers. Now the key point (and the reason I expend such effort on this list) is that it doesn't matter which of these devices we use. One encoding of $2+2=4$ is exactly the same as another, which is why we did not revise the laws of mathematics when we replaced abaci with calculators.

Reusability abounds. In Lambe's own example, the manufacture of orange jump-suits is probably centralized. The government most likely obtains them en masse, sending some to NASA and sending some to the prison system. Until individual markings are added at their final destination, they are essentially indistinguishable and interchangeable. Most physical objects are like this. When I buy a pencil, it does not matter much which particular pencil I buy, so long as it is of a certain type (orange, 2H). I select these, and many other objects, by their general properties. I

apply a pattern to my selection, and so long as an object matches that pattern, it (or any other one like it) will do.

It is true, as Lambe observes, that not all knowledge is applicable in all circumstances. My knowledge that ' $2+2=4$ ' would not be of a lot of help when using a roadmap to find the city of Paris. Nor does it assist (much) in the care and feeding of my cats. My authorship of this paper does not depend on the knowledge that ' $2+2=4$ ', though as an example I may mention the item from time to time. The same holds true for objects. If I wish to fly from Paris to London, I would use an airplane, not a pencil. If, by some unfortunate mistake, a contractor received a Buick instead of a brick, he would send it back rather than attach it to the exterior of the Undergraduate Hall. Knowledge is applicable to domains, domains are defined by a context of use, and a specification of the context makes it clear what sort of objects are applicable and what sort of objects are not.

Lambe's argument cannot be that knowledge is not reusable, for such a position is absurd. Lambe's position must, therefore, reduce to the proposition that only humans can recognize when one bit of knowledge, rather than another, is appropriate in a given circumstance. Cash registers require cashiers, he might argue. And the recognition that the knowledge that ' $2+2=4$ ' rather than, say, 'Paris is the capital of France' is a recognition of such a type that only a human can make the call. If everything rests on, as Lambe says, "the overriding primacy of local context for the applicability of knowledge and learning," then it must be shown that at least some part of this context is irreducibly human.

4. Completeness and Liberation

Suppose we had only two items of knowledge in the world, ' $2+2=4$ ' and 'Paris is the capital of France'. Suppose, additionally, we had a limited set of descriptions of contexts in which one of the two facts is required. How could we decide which item of knowledge to apply? We would want to know whether the context is a mathematical context, or a geographical context. We recognize these by abstracting for salient features of each context. If, for example, we detect a preponderance of numbers, we infer that we are in a mathematical context, and apply ' $2+2=4$ '. Otherwise, we infer that we are in a geographical context.

In other words, we know which knowledge to apply to a given context because we recognize the context. This recognition is based on one of two possible sets of criteria: either properties inherent to the piece of knowledge itself, or properties inherent to prior contexts in which the knowledge was successfully applied. [Footnote 1] Either way, the salient properties are in some way abstracted, codified, and compared to similar properties abstracted from the present context. If there is a sufficiently strong match, then the item of knowledge may be (with reasonable confidence) successfully applied.

In arguing against the possibility of applying knowledge (or learning objects) to particular contexts, Lambe must show that there is some part of this mechanism that cannot be automated, that there is some part of this mechanism that requires, in an irreducible fashion, human intervention. Lambe presents the argument in two ways: first, he suggests that there are some aspects of the description of the context that cannot be codified and transmitted; and second, he argues that there is no system of codification that could do the job. If we are unable to identify and compare the salient properties, obviously, no process of recognition can occur, and we must depend on a human, who has inherent powers of recognition, to make the match.

Lambe argues for the first of these propositions by suggesting that the necessary description of a knowledge item cannot be complete, in other words, that in the codification and transmission of knowledge, some aspect of that knowledge is lost, and that we therefore lack the means to apply it appropriately in a given circumstance. In particular, what cannot be codified and transmitted is human experience: "technology-mediated knowledge management is incomplete, unless it links us back into the physical, sensual, emotion-laden world we inhabit." A given taste, smell, emotion or feel is unique to a given human and cannot be abstracted and transmitted, and yet is necessary for the transmission of knowledge from one person to the other.

Lambe adduces several examples in order to illustrate this point, of which the case of learning how to cook wah kueh is the most plausible (and the most extended). To learn how to cook wah kueh one would, in normal circumstances, obtain a recipe. By following the instructions in the recipe, the theory goes, one can acquire the same knowledge as the person who wrote the recipe. However, essential to learning a recipe is the capacity to get the taste right. This is something that could not be encoded in the recipe, nor would it be reflected in the description of either the original context or the new context. The only way to know whether one has learned is to apply the recipe and taste the result, comparing this experience personally with the original. Writes Lambe, "We don't truly know until we have internalised, integrated into larger maps of what we know, practised, repeated, made myriad variations of mistake, built up our own personalised patterns of perception and experience."

The variability of human experience comes into play with respect to the second proposition. Even supposing that we could, in some way, codify all that was necessary in order to recognize when knowledge has been successfully applied to a given learning context, there is no language that could represent this codification. For in order to arrive at such a codification, we would require a language, and in that language, an ontology and vocabulary shared by both the learning provider and the learner. "It must be widely agreed, and there must be common definitions with common meanings", argue Lambe. But "Very little of real working life is run on agreed, common definitions."

Such a language will fail, argues Lambe, for four major reasons. First, the world cannot be objectively described in a stable way to everyone's satisfaction. Second, subjective variations cannot be moderated. Third, the world will change faster than our capacity to describe it. And fourth, most of us will simply not understand the terminology. If any of these four factors comes into play, the ideal of an objective language collapses, and hence we have no means of recognizing when an item of knowledge (or a learning object) can be appropriately applied to a given situation.

Moreover, even if, by fiat, we could dictate a priori an standardized language, such an effort would be doomed. It would lock us into a particular way of seeing the world, unable to respond to change. "In what way is the rigid application of standards for e-learning and knowledge management in our current state of awareness any different from a committee being formed in the Mainz of 1460 to legislate on the form, dimensions, specifications and design of the printed book for the purposes of proper housing and retrieval in libraries?"

5. Descriptions and Language

Lambe's arguments are compelling because they appeal to things we know to be true. The taste of wah kueh is distinct from the recipe. The viewing of the Mona Lisa in person is distinct from the viewing of a replication. Our experiences are personal, and because our view of the world, and

hence, our way of describing the world, depends on experience, our descriptions are personal. When I say, "wah kueh has a dry taste with a hint of rice flavour" the sensation I am describing may be very different from the sensation you imagine. That our experience, backgrounds, and beliefs vary one to another is evident in the differences between movie reviews, differences in favorite foods, and differences in religion.

That there can be no universal public language is, in my mind, indisputable. There is substantial argumentation in philosophical literature to show that a given ontology, and hence, a given semantics, is applicable only within a limited domain. This is why I argue (Downes, 2003a) that we do not want "one standard for all." But I also argue that we do not need it. A language (and hence, an ontology and a semantics) can be limited to a specific domain. This is, in fact, what happens, as nations, religions and professions adopt their own vocabulary.

What Lambe needs to show is two-fold: first, that some phenomena are ineffable, and second, that these phenomena are essential constituents of knowledge, that is, that there is no domain (however small) in which a given item of knowledge can be applied to more than one specific instance. We can easily grant the first. Otto (1923), for example, describes religious experience as ineffable. Nagel (1974) describes perceptual experience as ineffable. It is not possible to grant the second, however.

It is not possible because the object of our enquiry is knowledge, not experience. The two are very different things. One - experience - is like the pixel. It is concrete. It is situated in space and time. It has certain inherent properties, some of which may be ineffable. One might say that a perceptual experience is like a pixel (or many pixels, depending on your theory of mind) in the brain. Knowledge is not like that. Knowledge is, as we discussed above, an emergent phenomenon. It consists not of the pixels themselves, but as an abstraction of those pixels. Knowledge, by Lambe's own argument, is exactly NOT the sort of thing that can be ineffable.

Any item of knowledge, no matter how precisely defined, no matter how domain and context specific, is an abstraction. Because it is an abstraction, the specific physical manifestation of that knowledge is NOT a part of the knowledge itself, but only a part of the instance of that knowledge. And if the physical manifestation is not a part of the knowledge itself, it follows that knowledge may be transmitted from one location to another, from one physical manifestation to another, without loss.

Lambe's thesis is, at its heart, implausible. If, in order to be knowledge, something required a specific manifestation (as, say, a certain perceptual experience), then it would not be possible - ever - to pass knowledge from one person to another. It would be not merely difficult, but impossible, to learn how to (say) mix an Old fashioned from a drink recipe book alone; the inventor of the Old Fashioned would have to confirm, in person, no less, that the feat had been accomplished. Mathematics could never be taught without the aid of pebbles (or sheep, or whatever the originator actually used). Geography could be learned only through travel. And we know this isn't true; we know that none of it is true.

6. Deliverance

There is on the part of many writers a desire to attach something ineliminably human to common areas of human endeavour, and especially, to the practice of teaching and learning. This desire has intensified in the digital age as we see more and more of these endeavours migrating from the physical world to the non-physical. Thus we read writers such as Dreyfus (2001) warn that, in

cyberspace, we might "lose our ability to distinguish relevant from irrelevant information, lack a sense of the seriousness of success and failure necessary for learning, lose our sense of being causally embedded in the world and, along with it, our sense of reality, and, finally, be tempted to avoid the risk of genuine commitment, and so lose our sense of what is significant or meaningful in our lives."

In pedagogy there is a general principle, that it is better to experience the truth of something than to be told the truth of something. And so also, in acquiring knowledge, it is better to taste, to touch, to feel - to gain the sensations that accompany a given bit of knowledge - than it is merely to receive the knowledge in its abstract form. On receiving the abstract, the description, the emergent bit of a phenomenon, we need to in some way produce a concrete instance of it in our minds, in order to associate it with other experience and memories. Just as a data stream requires a computer screen in order to become, again, an image of a cat, so also must we instantiate new knowledge in our mental pixels.

As I wrote last year (Downes, 2002), while it is true that we need experiences in order to learn, "We are at all times connected to our body, at all times amassing and assessing a constant flow of sensory input. Even when we are watching television or surfing the Internet, the body's productions continue endlessly. The data we collect from the video terminal forms only one part and arguably even a small part of the experience of the moment." What the critics of knowledge management, of learning objects, of online communication, miss is that it need not be the SAME experience as that had by the sender.

This is a good thing. For otherwise, communication and education of any sort, and not merely of the distance or online variety, would be impossible. For even in the most personal of settings, even in the classroom or the one-on-one tutorial, there is no magic mind-to-mind transfer of perceptual experience. There is always a gulf, always a need for abstraction from experience, always a language (whether it be a written language, body language or visual language) into which this abstraction must be codified, always a medium through which it must be transmitted. The very essences of knowledge and communication lie in abstraction.

Lambe's argument, in the end, must appeal to some sort of mysterious mind-to-mind communication. "The least interesting thing about knowledge flowing down wires, printed on pages, painted on screens, or transmitted via communication signals, is how the signals are constituted and sequenced. Much more interesting is the complicity and sympathy of numerous brains acting in concert at the level of protocol (agreeing how to communicate, and knowing which genres to deploy when), while simultaneously pursuing and propagating variety and discord at the level of interpretation, constantly creating fresh, relevant, transient knowledge, out of the balletic dance and traffic of our more enduring but essentially static knowledge artefacts."

But it's just not so. The phenomenon of "numerous brains acting in concert" and the "balletic dance" are, in fact, complex sets of communicative activities occurring between humans, often expressed in very high level abstractions (a shrug, a smile, a seductive shuffle of the feet) in order to communicate, from one person to another, an emotion, a desire, a suggestion.

7. The Challenge Before Us

Human beings, when they communicate, are a veritable fountain of artefacts. We leave behind a trail of physical phenomena - words, songs, gestures, images, scents, touches - through which our ideas and knowledge are communicated one to the other. Very often, our communicative

behaviour consists not in the knowledge itself. We do not actually send abstractions of perceptual experiences. Rather, much of our communication consists of signs or representations of the phenomena being described. If I use the word 'cat' my intent is not to make a short, guttural noise, but to stimulate in you an abstract representation similar to the one that was present in my mind prior to my uttering the word. This presupposes some commonality of intent and meaning, a commonality so pervasive that some authors (such as Fodor, 1975) suggest that it must be innate.

The challenge of knowledge management, and hence of online learning, therefore consists in this: of being able to capture those artefacts, of being able to recognize the salient features of the context of transmission, of being able to store them in digital form, and of being able to recognize new contexts in which the same transmission would be of value. Though this sounds daunting, it has already been accomplished in simple form; the trick is to make it work with the complexity and richness of actual human communication.

That we HAVE made it work is evident from the fact that I can learn from Socrates. "Know thyself," the ancient philosopher famously said (presumably in Greek, and not King James English), and through a process of capture and transmission this important bit of knowledge was stored and transmitted to me via a book, was read, and has become part of my perceptual landscape. So we have made it work. But to make it work, we need to capture those useful bits of Socrates's monologues, such as "know thyself," and not those useless bits, such as "this drink is bitter."

But how? I would suggest the following:

Knowledge must be captured. This requires the creation storage of those artefacts that contain knowledge, and importantly, the distinction between those that do and those that do not. (Subsidiary: the discipline of knowledge management is essentially the discipline of recognizing those artefacts in everyday communication, while the discipline of instructional design is essentially the discipline of creating those artefacts specifically for this purpose).

Knowledge management systems must match the knowledge to the context. In a very narrow context, more concrete knowledge is appropriate, while in less well defined contexts, more abstract knowledge is appropriate.

Knowledge management systems must determine, and use, the language of the user. Sending English instruction to a francophone is inappropriate; so is sending management-speak to an engineer.

Knowledge management systems must embed emergent phenomena in physical instances, and hence, must provide some means through which the user can recognize the knowledge in the message. This may require the embodiment of the same knowledge in multiple forms and multiple modalities.

Knowledge must be instantiated as an experience in the user. This involves the creation (through, say, practice) of matching perceptual states in the user.

Knowledge management systems must not be static: they must recognize changing knowledge, changing circumstances, and changing languages.

I think that, in the main, the people working with knowledge management systems and with

learning objects recognize that they are working with artefacts, not bits of knowledge itself. But they also recognize that the purpose of a knowledge object or a learning object is to provide a temporary physical medium in which the knowledge itself, which is an emergent property, can be transported from one person to another.

It is a difficult, tedious and often painstaking process. But it is no miracle. Human knowledge is ALREADY embedded in non-human physical form in the words, writings, behaviours and other artefacts created by people in the course of day-to-day discourse. This knowledge CAN be recognized mechanically, because the conventions used to encode the knowledge in the artefacts are PUBLIC conventions. And they CAN be transmitted to new listeners because the very same artefacts were intended to be used in precisely this way.

Far from being autistic, knowledge management and learning object specialists are probably among the most socially minded of all professionals. And hence, we see in closer examination, not the autism of knowledge management, but the affability of it.

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[Footnote 1] It has been argued - I believe successfully - that the properties required for successful recognition are in many cases (if not most cases) not inherent in the item itself. This is why in previous articles (such as 'Learning objects in a Wider Context' I argue that the codification of these properties, expressed as metadata, should describe the environment in which the object was used, and not merely the object itself. See Downes (2003).

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Public Policy, Research and Online Learning

I was just at a meeting of planners and policy analysts at a meeting here in Ottawa yesterday and so I have some thoughts fresh in my mind.

We were presented with a talk suggesting that what decision-makers need is an account of e-learning that shows that it is (either or both):

- more effective than traditional learning
- more efficient than traditional learning

In other words, the demand appears to be for (mostly quantitative) comparative studies. These studies would be used to justify (partially in hindsight) the large investment in e-learning.

On the one hand, this is a justified retrenchment. As with any large-scale public investment, it is reasonable and rational to ask whether we are receiving any sort of return. We need to be able to show that e-learning has had a positive impact, and we need to explain why money spent in this arena is well spent.

But in my mind across the board comparative studies miss the purpose and impact of e-learning. Policy that is guided via such studies will paint a misrepresentative picture of the field. Such studies may be used to suggest a divestment in the face of dubious or questionable results.

In our meeting we were presented with preliminary results of a study developed by Charles Ungerleider and Tracey Burns using the methodology proposed by the [Campbell Collaboration](#). The credo of the Campbell Collaboration is that research ought to be based on evidence. It is hard to dispute such an assertion, especially for myself, a die-hard empiricist.

But the Campbell Collaboration goes further. Drawing from the methodology of the [Cochrane Collaboration](#) used in the field of medicine, the idea of the Campbell process is to systematically evaluate a set of empirical studies in which the impact of a single variable or intervention is compared across a study group and a control group.

Thus, in the case of e-learning, the methodology would propose that we study two groups of students, one group in which e-learning had been introduced, another in which e-learning had not been introduced, and measure the impact of e-learning against a common metric. In the case of learning, the metric would typically be the students' test scores.

My previous experience with [this sort of study](#) was informed by my work with Tim van Gelder, who applied a similar testing and evaluation regime against a group of students studying critical thinking with the aid of a specific piece of software, ReasonAble. By controlling for students' prior knowledge and experience, van Gelder was able to show an improvement in attainment using the software in comparison with students in other environments taking the same pre- and post-instruction tests.

I think that this is a good result. However, even such a test, rigorous and transparent though it may have been, does not meet Campbell Collaboration criteria because of the absence of a blind control group (evaluations, conducted by a testing center in Los Angeles, were blind). And in my mind, this is an appropriate application of a Campbell-like methodology. But that said, it must be

observed that the results of such a test are extremely limited in their applicability.

The idea behind a Campbell-like methodology is that it measures for a single intervention (or a small, easily defined cluster of interventions) against a known and stable environment. Thus, what we see in the Gelder example is a case where students taking a first year philosophy class are measured. Aside from the use of the digital tool, other variables are held constant: the class is scheduled, it is held in a physical location, it consists of an instructor, a teaching assistant and a certain number of students, it employs a standard curriculum, the instruction is paced.

In other words, what is happening is that the use of the new innovation is testing according to its capacity to do the old thing. It is like testing electronic communications as a means of reducing the price of a stamp, or of reducing the time it takes for a piece of mail to travel through the postal service from Ottawa to Vancouver. It is like evaluating airplanes on their capacity to move through the Rocky Mountain tunnels more efficiently than trains or on the basis of whether they will float in a rough sea.

The Campbell Collaboration methodology works exceptionally well in a static situation. The medical analogue has shown some success because, in many instances, the conditions and objectives before and after the treatment of a disease are static. But even in medicine, the applicability is limited. One area in which the Cochrane Collaboration was employed, for example, was in procedures for the treatment of war wounds. Certain interventions may be tested and improvements in the treatment identified. But the most effective means of treating war wounds - stop having wars - falls beyond the bounds of the Cochrane methodology. The only successful practices identified presuppose the having of a war, and consequently, the most effective remedy fails to gain any empirical support despite the existence of a substantial research program.

During the meeting yesterday I remarked that one of the characteristics of a Campbell Collaboration approach is that its conclusions are contained in the question. No doubt this may have been interpreted as a political statement, and perhaps there were ways I could have said it more carefully in the two minutes I was allotted through the course of the day. But the statement is accurate, if not from a political stance, then from a scientific stance. Studies following a Campbell Collaboration methodology are instances of what [Kuhn](#) calls "normal science." The answer is contained in the question in the sense that the overall methodology - the paradigm - is assumed as a constant background in which the experimentation takes place.

In the field of learning, "normal science" consists - as it did for the van Gelder study - of classroom based instruction, the success of which is informed by testing. In the field of education as a whole, normal science consists of sets of courses and programs offered by traditional institutions in a mostly paced manner, the success of which is informed by (increasingly popular) standardized tests.

The problem with measuring e-learning in such an environment is what counts as teaching and what counts as learning is held to be static both before and after the intervention. To put it a bit crassly, the standardized tests pre-suppose that if a student is able to demonstrate the acquisition of a body of attained knowledge - reading, writing, mathematics, to name a few - then the student has demonstrated that he or she has learned. The mechanics and the methodology of the traditional system are geared toward the production of student who have attained and retained this knowledge, and who have attained it in a certain way.

But as I have urged through numerous papers and talks, e-learning is fundamentally different from traditional learning. It is not merely a new way of doing the old thing. Not only does it create a new methodology, it creates new - and unmeasurable, by the traditional process - outcomes. In particular, I identify three major ways in which e-learning cannot be compared to traditional instruction:

1. Its newness - traditional learning is well entrenched, while e-learning is brand new. Many of the tools and techniques involved in e-learning have not been developed yet, so in an important sense comparative studies are attempting to measure something that does not exist. Moreover, the use of those tools that do exist is not informed by appropriate methodologies.

The first generation of e-learning applications did little more than transfer the method and structure of the traditional classroom to an online environment. Products like WebCT, for example - originally designed as a set of course tools, hence its name - are designed to deliver a pre-designed and often paced collection of educational content in a traditional instructor-student mode of delivery. Though this approach was a marketing success, appealing as it does to those entrenched in a traditional model of delivery, it is far from clear that this is the most appropriate use of new technologies for learning.

The use of computers in the classroom is similarly suspect. We heard from Angela McFarlane that despite the availability of computers reaching near ubiquity, they are seldom used by students for learning, and what learning does occur, is in the use of the tool. It is little surprise, then, that her studies show little, if any, positive correlation between the use of computers in school and achievement on standardized tests.

McFarlane moreover observed that students use computers three times as much at home as they do in school. Moreover, she noted, the degree of usage at home was positively correlated with educational achievement (as defined by test scores). So what are we to make of this? The only positive correlation to be found was the result of factors completely outside the evaluation parameters, and is revealed only because the Campbell methodology was not followed. How is it that computer use at home correlates with higher test scores; what are students doing? And even more importantly, what are students learning - if anything - over and above that which could be detected by standardized tests?

2. Differing objectives - when we talk about the use of computers in learning, the purpose of this use is assumed to be the same as the purpose of traditional teaching. But there are clear instances in which the use of new technologies goes beyond what we sought to attain in the classroom.

Valerie Irvine sketched a number of such objectives. The use of online learning means that various groups of people - people living in rural communities, people who are disabled, people who must work for a living - are able to obtain access to an education previously unavailable to them. The only reasonable comparison that could be made is between online learning and nothing at all. This, of course, once again breaks out of the Campbell methodology, because there are no constant variables to be maintained.

Indeed - to go a bit beyond Irvine's point - the use of online learning to extend accessibility could be viewed, on the strict basis of achievement in tests, to be a bad thing. It is at least possible that these new students, because they had been away from learning for so long, will actually score lower in tests than their more privileged counterparts. Thus, the overall impact of e-learning would be a reduction in test scores.

Just as hospitals that cater only to the healthy will appear to be more successful, just as schools that demand strict admission standards will appear to produce more educated students, so also will a system that caters only to those with no barriers to their education will appear to be more successful. When a significant group of people is eliminated from the test by the testing methodology, the results are skewed.

It is moreover not clear that the educational outcomes produced via the use of computers is the same as those produced in the classroom. As I remarked above, the traditional classroom and the standardized test measures the attainment and retention of knowledge. It is arguable, and I would argue, that online learning fosters and promotes a different type of learning, one I expressed yesterday as the capacity to "think for oneself." It is hard to make a worthwhile point in ten seconds, however, I think that it online learning produces a sense of empowerment in people, drawing out the shy, giving a voice to those who would not speak, helps people find information on their own, proposes creativity and communication, and helps people develop a stronger sense of personal identity.

I draw out this list because these are properties that I have seen reflected in various reports of the use of e-learning and ICT in general. Such effects are not measured by standardized testing, however, and it is not clear to me that any Campbell study could reveal them. For one thing, how would we accomplish such a feat? Would we seize the students' computers from their homes for the duration of their primary studies in order to obtain a control group? And how does one measure a stronger sense of identity? It is not possible to find even a correlation, much less a causal connection. Even if a student is barred from computer ownership, the total environment - the media, their behaviour of their connected friends - will have an impact on the outcome.

3. Scope and Domain - the purpose of a Campbell study is to measure the impact of an intervention in a specific domain. However, it is likely that studies from beyond a specific domain will be relevant to the current result.

For example, I suggested that usability studies would have a direct bearing on the evaluation of the effectiveness of e-learning. In a usability study, the ease with which a group of people can attain a certain result is measured. These measurements are then used to determine whether a given application or system is "usable," that is, can be used in the manner intended.

It would seem immediate and intuitive that usability would be a significant variable to be considered when evaluating the effectiveness of e-learning. There is no shortage of articles and discussion list posts lamenting the poor usability of e-learning applications. If these applications, which are known and measured to be unusable, are being used in the evaluation of e-learning, then is the failure of e-learning in such a context to be based on the general uselessness of e-learning, or on the application in particular? We see no such distinction being made.

In a similar manner, there have been numerous studies of online communities over the years, beginning with Turkle's "Life on the Screen" and including the work of Rheingold and Figallo. Now these studies, in addition to not even remotely following Campbell methodology, are again completely outside the domain of online learning. Moreover, they never could be, because the provision of an education by means of an online community involve the imposition of not a single intervention, but rather, of a whole series of

interventions.

I have commented on the use of online communities in the traditional educational setting before. Characteristically, such communities consist of only a limited number of members, usually the students of a particular class. Moreover, such communities typically have a starting point and an end point; when the class is over in June, the community, after a life of 8 months, is disbanded. Further, such communities are artificially contrived, grouping together a set of members that have no more in common than their age or their enrollment in a given class. Any measurement of a community in such a setting is bound to be a failure because the constraints of the traditional classroom - required in order to conduct a single-variable study - have doomed the community to failure, a failure that can be predicted from research outside the domain of education.

The comment was made by several participants that the methodology employed in the physical sciences, as instantiated in the Cochrane Collaboration, cannot be carried over to the field of education (McFarlane commented that it is losing credibility even in the physical sciences). Cognitive phenomena, such as learning, are not the same sort of things that as physical phenomena. Indeed, some physical phenomena are not the sort of things that can be studied using the physical sciences.

In my own opinion, the theoretical basis for this assertion lies in the nature of the physical or cognitive phenomena being studied. In a classical physical experiment, as mentioned above, the system being studied is controlled. The effect of external variables is minimized or eliminated. Only the impact of a single intervention is studied.

Such a system works well for what might be described as causal chains - A causes B which in turn causes C. But in certain environments - the human immune system appears to be one, the world of microphysics appears to be another - the classic physics of the causal chain breaks down. What we are presented with instead is what might more accurately be described as a network instead of a chain: everything impacts everything. Multiple - and perhaps unrelated - sets of circumstances produce the same result. Even the concept of the 'same result' is questionable, because the existence of condition P in network N might be something completely different from the existence of condition P in network N1.

Because of the nature of the network, general principles along the lines of 'If A then B' are impossible to adduce. Indeed, attempts to observe such principles by preserving a given network structure produces artificial - and wrong - results. The very conduct of a traditional empirical study in such an environment changes the nature of the environment, and does so in such a way as to invalidate the results. In a network, in order to produce condition B, it might be necessary to create condition A+C in one case, C+E in another, and G+H in another. This is because the prior structure of the network will be different in each instance.

Human cognition is a network phenomenon at two levels. One level has always existed; the other is a new development, at least to a degree. In the individual, human cognition has always been a network phenomenon. Mental states consist of the activation and interaction of neural states. These neural states exist in combination; none exists in isolation from the other. Even when we identify something that is the "same" - the belief that "Paris is the capital of France" for example - this sameness is instantiated differently in different individuals, both physically (the actual combination of neural activations is different) and semantically (what one person means, or recollects, about "Paris" is different).

The second level, greatly enhanced and extended by ICT, is the interaction of humans with each other. Though at the community level there was a certain sense in which every person was related to every other (especially in smaller communities), this has never been true at anything like a global level. However, the much denser degree of interactions between humans fostered by new communications technologies - including but not limited to the internet - has created a global dynamic that is very similar, in terms of logic and structure, to the cognitive dynamic.

The very idea of isolating a social phenomenon - such as education - and the measurement of a specific intervention - such as e-learning - should be questioned. The education of an individual, then education of a society: neither exist without impacting and being impacted by a range of other phenomena. The impact, therefore, of an intervention in education might not be realized in educational attainment at all.

In the last 30 seconds of my comments I tried to draw this out. Probably it was, unfortunately, simply interpreted as a dogmatic anti-testing stance. But the essence of my comment was that the tests we use to evaluate the impact of an education are not appropriate because they measure the wrong sort of things, because they are, indeed, representative of the cause-effect view that an educational intervention will have an educational result.

This is not so. In the meeting I highlighted two clear impacts of education outside the field of measurement. One was the correlation, well established, between the level of educational attainment and the person's income level. Another, less well established, was the correlation between the level of education in a society and the crime rate in the society. I could suggest more examples. Greater educational attainment, for example, may correlate with improved health. Greater educational attainment could correlate with an increase in the number of inventions and (heaven forbid) patents.

None of these would be captured by a traditional research program. Moreover, a traditional research program will also abstract out the impact of non-educational factors at the input end. For example, it has been suggested that the best way to improve educational attainment in the United States is to ensure that every child has a hot lunch. It has been suggested that healthy students learn better. Perhaps the road to educational attainment in the United States lies through their social welfare and their health care system.

So where do we go from here?

First, we can stop doing some of the wrong things. In particular, we should stop thinking of an education as something is attained by, and that benefits, an individual in isolation from the rest of the social network in which he or she resides. This is not to disclaim the importance of personal responsibility, and personal achievement, inherent in education. But it is to place these in an appropriate context.

The valuation, therefore, of "intervention A produced result B" studies (common in the educational literature) should be significantly reduced. Such studies are not producing reliable or useful research data, and in some cases, are producing harmful results. Just as the anecdote is not a reliable ground on which to infer a statistical generalization, so also a controlled study is not a reasonable ground on which to infer a network phenomenon.

Second, stop seeking - and believing - generalizations. That is not to say that nothing can be learned about the properties and behaviours of networks. It is to say that the sorts of

generalizations obtained by single-variable experimentation will say nothing about the properties and behaviours of networks. Money invested in such research is, in my opinion, lost money. The generalizations that result may cause more harm than good.

For example of this, consider the various business and industrial organization strategies that have been all the rage in recent years. We have progressed through TQM, open concept offices, flattened hierarchies, entrepreneurial sub-units, and more. Significant evidence was brought to light testifying to the success of each of these management strategies. Yet none of them achieved the wide-ranging success promised by their proponents, and in some cases, the upheaval brought companies to the brink of ruin. Why would something that worked so well in one company work so poorly in another? Companies - like individuals, and like societies - are networks, organized in various structures internally, and subject to a wide range of influences externally.

There is no "magic bullet" that improves companies - if there were, it would have been discovered somewhere in the proliferation of business strategies. Just so, there is no "magic bullet" that improves education. This should be obvious! An intervention that will work at Ashbury Collegiate will have mixed results at Osgoode Township and may be a disaster at Davis Inlet. You cannot generalize across isolated entities and phenomena in networks.

Third, reconsider the criteria for success. Very narrowly defined criteria for success are not only misleading, they are dangerous. They indicate that failure has occurred when it has not; they indicate that success has occurred when it has not. For example: any traditional evaluation of my education would conclude that it was a failure. I was even included in a post-graduate study (University of Calgary students, 1986). The last (and I assume final) time the impact of my university education was measured, about ten years ago, I was living in poverty, having been able to eke out only the most meagre living on the strength of my philosophy degrees. But significantly, to me, my education had been a success even at that time, because the quality of my life (my mental life, if not my standard of living) had been greatly enhanced.

The fact is, there will never be a nice neat set of criteria for success in education, no more than there will be a nice neat set of criteria for what constitutes the "good life" or for what constitutes "moral purity." Such assessments are extremely subjective. In education, they are currently the subject of political and cultural debate, not scientific or educational rationale. Even something as simple as "knowing how to read" is subjected by the push and pull of different interests: in the seminar yesterday we heard that, from the point of view of the phonics industry, some people could not "read" because they were shown to be unable to pronounce new words (in other words, because they were not proficient in phonics). From another point of view, comprehension, not pronunciation, may be viewed as crucial to reading. From yet another point of view, the capacity to infer and reason is the basic criterion for literacy.

Success in education, like any network phenomenon, can only be defined against a context. The evaluation of what is achieved can only be measured against what the achiever sought to obtain. Just as it is unlikely that society as a whole, let alone individuals as a whole, seek to attain nothing more than high test scores, so that measure high test scores are an inadequate measure of achievement. A person who drops out of high school in order to become a successful rock musician should be judged to have been an educational success; a person who achieves the honour roll but who lived a frustrated and unfulfilled life should be considered an educational failure.

The criteria for measuring the success of an education must be derived from multiple sources. We

already hear from business and industry that their criteria - the usefulness and productivity of future employees - may not be predicted by success in academia. No doubt an individual's account of success - whether they were happy, fulfilled, rich - will vary from person to person. The social criteria for success - better health, lower crime - varies from time to time and from political and social group to group.

Success, in other words, is not a micro phenomenon. It is not identified by a set of necessary and sufficient conditions in an individual. It is, rather, a macro phenomenon. It is identified by structural properties in the network as a whole. Such structural properties do not depend on the specific nature of any given entity on the network, but rather are emergent properties of the network as a whole (for example: the appearance of Jean Chretien's face on a TV screen does not depend on whether any given pixel is light or dark - it is an emergent property, recognizable not by studying the pixels but rather by studying the patterns produced by the pixels).

Fourth, adopt methodologies and models appropriate to the study of network phenomena. I [discussed](#) several of these approaches in OLDaily. We need to enter a research regime in which we are comfortable discussing multiple realities, alternative models of society, macrophenomena amidst micro-chaos. We need to begin to look at education as only a part of a larger, multi-disciplinary approach to understanding social and cognitive phenomena. We need to abandon, indeed, the idea that there are even specific disciplines in which isolated research may take place. Just as it is now current to attach economic values to social-political phenomena, we need to begin attaching values from a wide range of schools of thought to other disciplines.

To take this a step further, we need to reconsider the language and logic used to describe such phenomena. In my own work I adduce associations between similar, but disparate, sets of phenomena. That is to say, I do not try to trace causal structures, but rather, I attempt to observe patterns of perception. You might say that I attempt to identify truths in cultural, social and political phenomena in much the same way you attempt to identify Jean Chretien on a TV screen. In order to do this, however, I need to employ new terminology and new categories not appropriate within the context of any given field of study, just as your description of a certain set of phenomena as "Jean Chretien's ear" has no counterpart in the language of pixels and cathode ray tubes.

Finally, fifth, we need to reconsider the locus of control. The very idea of evidence-based public policy assumes that an external intervention at some point in the network can produce some observable - and presumably desired - results. There is no reason to believe this, and indeed, good reason to believe the contrary. It is like supposing that, by the stimulation of a few neurons, one can create the knowledge that "Paris is the capital of France." But neurons - and mental phenomena - do not work that way. At best, we can produce the metal equivalent of physical phenomena - the sensation of toast burning, for example. We can produce the sensation. But we cannot produce the articulation, the realization that it is "toast burning." A person who has never experienced toast burning would describe exactly the same phenomenon in a different way.

The only measurable impact of an intervention will be at the macro level. We already see this in economics. We cannot, for example, evaluate the impact of an increase in interest rates by changing them for the City of Grande Prairie and observing the results. For one thing, it is not possible to isolate Grande Prairie from the world, remote though it may be. Raise the rates in Grande Prairie and residents will borrow from banks in Dawson Creek; lower them and residents from Dawson Creek will travel to Grande Prairie. Moreover, the effect of interest rates in Vancouver impacts the level of employment in Grande Prairie, since the cities are connected by a

variety of trade, cultural and other associations.

The corollary of this assertion is that micro-interventions will not be measurable at all, at least, not in any meaningful way. It follows, therefore, that it is misguided to attempt to intervene at this level. For example, it may be proposed to adopt one particular type of educational intervention - the use of ReasonAble, say - in a pilot program and to measure its educational impact. But the impact, if any, will be swamped by the variety of external variables. A policy approach, therefore, that directs research at the micro level will produce no useful research results.

Thus, interventions at the macro level should not attempt to determine how they are instantiated at the micro level. Nor should they be described in such terms.

Concretely: a macro level intervention might be described as "increasing the connectivity of Canadians." The manner in which this intervention is implemented is not further described: it becomes the prerogative of each individual to respond to this intervention in his or her own way. Nor is it limited to some pre-selected "best" or "most appropriate" set of projects, nor is an attempt made to isolate the environment in which the intervention takes place. Nor are individual applications of the initiative evaluated, because the evaluation itself will skew the manner in which the intervention was instantiated (this creating another element of micro-control). Rather, we would ask, as a result of the connectivity program, first, did the level of connectivity increase, and second, are there any other desirable phenomena, such as a reduction in unemployment, which appear to be associated with this phenomenon.

Obviously, experimentation at the society-wide level is a risky undertaking. Such experimentation should be preceded by simulation and modelling in order to reduce the risk of an experimental failure. To a certain degree, we should try to learn from similar experiences in other jurisdictions. In the areas where we lead the world, we should try to learn from similar experiences in different domains - what can education, for example, learn from the decades-long intervention created by the ParticipAction program?

To conclude...

The introduction of ICT to the educational environment - and to society at large - has produced a paradigm change in the study of social and educational phenomena. This is not something that I am advocating, it is not that I am proposing as an instrument of public policy. It has already happened; as McFarlane commented, students are already voting with their feet. Learning is already occurring outside the classroom; the internet has already transformed the study (and play) habits of the young. It has transformed an area of endeavour that once could be understood (if it could be understood at all) through traditional cause-and-effect empirical science to something that must be understood only through a quite different perspective and methodology.

The idea that we can control any individual element of this new environment must be abandoned. To the extent that we could ever control such effects, this is no longer the case, and we are deluding ourselves if we believe we can derive new knowledge from the study of isolated events. Even the criteria for success - what counts as a successful methodology in education, what counts as a failure - can be measured only via system-wide phenomena beyond the narrow domain of educational attainment itself.

To the extent that we wish to improve society - and the very concept of public policy presupposes that we do - we must base our initiatives not on narrow and misleading studies conducted in

artificial environments, but on modelling and analogy from similar circumstances in different domains and different environments. We need to form as clear a picture (or set of pictures) of society as a whole as we can, and to understand the inter-relationships between and across sectors, across disciplines, and to form policy on that basis, rather than on the now-illusory premise of a magical wand that will foster universal happiness.

This is what I tried to say in my two minutes.

Freedom in E-Learning

Five posts from my participation in a recent IFETS discussion around a theory of e-learning. I focus on the suggestion that learning requires a curriculum and propose instead that e-learning allows us to introduce freedom to learning. The full discussion archives are [here](#).

1. Discussion Topic - Theory for eLearning

[As posted in today's OLDaily...]

The [current discussion](#) paper for the International Forum of Educational Technology & Society, this paper takes the broad view of e-learning and posts a set of ten principles. I think it's a good discussion starter. I think that the resulting discussion will find these principles too narrow. For example, the author posits that "eLearning can be used in two major ways; the presentation of education content, and the facilitation of education processes," which leaves out a whole range of applications based on game playing and simulation. Additionally, he writes that "eLearning tools are best made to operate within a carefully selected and optimally integrated course design model," which again leaves out any sort of open-ended and undesigned learning. Finally, he proposes that "The overall aim of education, that is, the development of the learner in the context of a predetermined curriculum or set of learning objectives, does not change when eLearning is applied." This gets both the overall aim of education wrong, and understates the impact of technology. But like I said, it will be a great discussion-starter.

2. Hypothesis 9

I don't want to cause too much of a digression from the main points of this discussion, but I have been asked to elaborate on my comments a bit. I won't elaborate on all of them, for reasons of length, however this seems to me to be a good starting point.

Hypothesis 9 states, "The overall aim of education, that is, the development of the learner in the context of a predetermined curriculum or set of learning objectives, does not change when eLearning is applied."

By way of explanation, we read: "In other words, the curriculum is still king." And later: "If participation in a bulletin board is not relevant to the curriculum, then its use as an assessment tool should be questioned."

There are two bits to hypothesis 9. Let me tease them out gently:

1. The overall aim of education is the development of the learner in the context of a predetermined curriculum or set of learning objectives, and
2. E-learning does not change the overall aim of education

Now let me analyze the first part. It breaks down into an objective and two contexts.

Objective: development of the learner

Context: predetermined curriculum, or, set of learning objectives

OK, now let's look at the objective. At first blush, though it sounds reasonable, it's too vague. Running a mile a day would develop the learner (or, at least, the learner's leg muscles), but we would not call that education. When we talk about education, we usually mean something more specific: cognitive development, for example, or moral development, spiritual development, social development.

Rather than quibble about wording here (though a proper theory should contain some precision on this point) let me use these observations to establish that there is a wide range of objectives involved in learnings, objectives usually (though not exclusively) related to capacities, involving not only knowledge and skills, but also an understanding (say) of appropriate behaviours and responses.

Having said that, let me look next at the contexts. To focus on the point directly, we need to ask: are the contexts defined (the tools defined? I'm not sure 'contexts' is the right word here) both necessary and sufficient for each of the various objectives of education. I would argue that they are not, which is why I comment that the definition is too narrow.

Consider, for example, one legitimate objective of an education: the development of successful social skills. To establish our point, we look at four questions:

i. Is a predetermined curriculum necessary for the development of successful social skills? Clearly not. There is to my knowledge no predetermined curriculum for recess or pub night, those parts of education where schoolchildren and university students respectively develop their social skills.

ii. Is a predetermined curriculum sufficient for the development of successful social skills. In principle it is possible, I suppose, though there would have to be some statement about the curriculum being applied. I have seen curricula with this objective. But typically, even a predetermined curriculum would advocate exercises and activities beyond the curriculum. At some point, as when learning to fly an airplane, you have to leave the instruction behind and fly the plane solo before you can say you have learned to fly.

iii. Is a set of learning objectives necessary for the development of successful social skills? In other words, could social skills develop in an environment where no learning objectives are stated? Of course they could, and thus learning objectives are not necessary, at least in this case.

iv. Is a set of learning objectives sufficient for the development of successful social skills. Again, there would have to be something said about the application of learning objectives (consider the bully saying, "I'll teach you respect," and then administering a beating. A desirable learning objective was stated, but the desired result was not obtained).

However we define the objectives of education, it seems clear that a predefined curriculum and a set of learning objectives is neither necessary nor sufficient for the attaining of those goals. The desired objective could be met in a much less structured environment, an environment conducive to such learning, but not designed with such learning in mind. And the desired objective may fail to be met in environments specifically designed with such learning in mind, but where for any of a large number of reasons the learning does not occur.

OK, let's set all this to the side for a moment and look at the second part.

The second part consists of the assertion that e-learning does not change the overall aim of education. This at first sounds true, because it could be argued that whether or not e-learning is employed, the goal remains the development of the learner. However, as argued above, this goal is too vague. Indeed, from the discussion above, it should be clear that, if we leave the goal expressed in such a vague manner, then the hypothesis expresses a significant and startling thesis.

For, consider one of our candidates: the development of leg muscles. Were we to allow that this is an objective of an education, then we would reach the startling conclusion that a goal of e-learning is the development of leg muscles. Now this could be true - I do not want to presume the opposite - but I suspect that it is a point that would require a significant amount of argumentation.

If we leave the definition vague we require a significant amount of argumentation. But if we make the definition more precise, we see that the statement is simply false.

Consider, for example, a fairly basic skill: communication. Now this is something that, we would agree, that we desire a student to learn whether or not the education is delivered online. But what constitutes communication, what constitutes the sort of development we would like to foster, is very different in the two environments. The basic act of writing online is different from writing offline. Penmanship (which is what it was called when I was a child, and on which we spent many days) is degraded as a necessary attainment; typing, which was once taught only to those in the secretarial stream, is now an essential skill.

You see, what is hidden in the statement that e-learning does not change the goals of education is the assumption that the world for which a child is being prepared in a traditional education is the same as the world for which a child is being prepared online. But it is not. One of the reasons why we would even consider e-learning is that we are entering an e-world. Or, put another way, the very fact of e-learning changes the rest of the world. People educated online use instant messaging the way people educated in an analog environment use the telephone. But just as the two communications tools are different, so are their uses, norms, behaviours, codes and practices.

The points I have raised above are sufficient, I think, to establish the comment that I made in my newsletter. At the very least, they explain the reasoning I went through when I made the comment. But I would like to take this all one step further by combining the two points. I'll do it in slogan form first:

Learning online is a lot more like the learning we did during recess than it is like the learning we did in the classroom.

What does that mean? Well, overall, what it means is a shift in the balance. In a traditional education, most of the learning is obtained in the context of a structured curriculum and learning objectives. The unstructured learning was viewed mainly as filling the gaps, rounding out the rough spots, and applying the in-class learning. But online, most of the learning takes place in an unstructured environment, while learning using a structured curriculum and learning objectives is used to fill gaps, round out rough spots, or to support practical learning.

The argument to support this point would probably fill a book. But I can suggest at least what the framework of such an argument would look like:

- Much of traditional learning is based on control; control was required for a variety of reasons but mainly because learning was standardized and therefore neither interesting nor useful to the learner

- learning was standardized because it had to be; there was no efficient means of delivering personalized, enquiry-based learning to the mass of students in an industrial society

- but in the internet age, these limitations no longer apply; it is possible to deliver personalized, enquiry-based learning.

- Therefore, standardization is not necessary

- Therefore, control is not necessary.

I know that's pretty sketchy, and probably not without its own contentious point. But my belief is that this is where e-learning is taking us, and therefore would argue that the goals of learning are very different in an online environment than they are in a traditional classroom.

3. A couple of quick points... (in Response to Mark Nichols)

1. In your response you refer several times to a legal or institutional framework in order to justify the need for a predefined curriculum. For example:

"The harsh reality is that we must as accredited providers of education work within pre-determined and clearly documented curricula."

"These are identified and transparent standards of learning that students must meet if they are to be accredited with a pass. "

"Even a PhD has objectives and criteria that must be met - otherwise how will you be able to confer one?"

And so on; the point is restated in various forms throughout the response.

Now I ask, is education to be equated with the social, political or institutional framework for paying for or recognizing education? In other words, do we define in terms of what governments will pay for, in terms of what employers or students recognize?

I would argue against this proposition, on the simple grounds that government, corporations, and various other organizations involved in the regulation of education may have the definition wrong.

For example, if we define education in terms of what is needed to confer a PhD, as suggested above, how do we know that we have correctly described the conditions under which a PhD should be granted?

2. I don't want to be diverted by the question of 'process-based' as opposed to 'outcomes-based' systems (or assessment-based as opposed to teaching-based criteria) for describing learning. For

the purposes of my argument, they can be seen as two sides of the same coin.

That is is, I would argue that just as what counts as education is not defined by the criteria used to assess learning, so also what counts as education is not defined by the process through which learning is intended to proceed.

The reason why I take these positions is that both process and assessment are intended as tools in order to achieve a certain objective, and it is circular to define the objective in terms of the tools used to achieve that objective.

For example, were we to define "travel" in the same manner, then we would be defining "travel" as either "using a car or vehicle of some sort" or "showing that you have arrived at a given destination." But neither would be satisfactory definitions of travel; they describe the process used to achieve travel, or the determination of when travel has occurred, but they do not themselves define "travel."

3. You state, "the sound application of eLearning would provide social opportunities because social interaction in addition to its lifelong learning transferability is an ingredient of best practice in education."

I agree with this statement.

But we need to ask WHY social interaction is an ingredient of best practices in education. It is not clear that the benefits of social interaction are described in statements of learning objectives of curriculum. For example, we do not see:

- "The student will learn to engage in meaningless social chatter in an online environment."

or

- "Today's lesson: ten minutes of fruitless discussion."

Yet both are characteristics of a successful education. But though being characteristics of a successful education, their occurrence and emergence cannot (almost by definition) be planned; they are at best emergent properties of a learning environment, and typically occur in spite of, not because of, a definition of learning outcomes or curriculum.

This is especially the case in the workplace. I read constantly (the most recent being an article this week) of how companies are trying to clamp down on "non-work" uses of the internet. Yet they fail to recognize that such non-work uses are an essential component of learning, albeit one that would never show up in a corporate training plan.

4. Nice statement: "I am of course relating the ten statements of eLearning to an institutionalised context..."

I would argue that online learning de-institutionalizes learning, and that therefore those elements of learning which emerge as a consequence of institutionalized education are stripped away in an online learning as non-essential elements of learning.

This is, indeed, my position in a nutshell.

5. You write that you wrote, "If participation in a bulletin board is not relevant to the curriculum, then its use as an ASSESSMENT tool should be questioned." Further, "I am observing that to assess a student based on bulletin board use outside of reference to the curriculum is inappropriate."

My first reaction is, "Why not?" But of course I know better.

This is an instance of the more general principle that, in order for an assessment to be fair, the criteria of assessment should be known. In this case, the method for making the criteria known is to post them as curricular or learning objectives. The evaluation of class activities which fall outside those objectives cannot be known, and thus, it is unjust to assess students based on those activities.

I did not linger on the point of assessment because I think that masked under this reasonable argument is a more general, and less justifiable - position. One might ask, if the bulletin board does not support the learning objectives or curriculum, why use it at all? This is certainly the principle many students employ: if it's not being assessed, why should I take the time to use the bulletin board?

My view is that this is an artifact of a system of education where learning is defined in terms of learning processes and assessments, as discussed above. "Learning," properly so called, does not exist if it's not on the test, and therefore students shun the practice that does not lead to learning. yet to see And yet - a great deal of learning takes place in discussions outside the classroom, learning which is not formally assessed, but assessed nonetheless (just as now readers are trying to decide whether I am knowledgeable or just a crackpot). It is arguable - and I would argue - that if students are told through a formal process that the only way to learn is to learn through a formal and structured process, then they will find themselves unable to learn in a less structured environment. The definition of learning makes itself true through its application - somewhat like Kierkegaard's leap of faith, but applied to other people, not oneself.

Imagine the situation were we to assess art that way. An artist would be judge great by the manner in which he or she were able to colour between the lines, rather than assessed against the unstated, unwritten, non-existing criteria of greatness. I wonder what school would look like were grades assigned at random, were grades assigned by unseen external observers with hidden criteria, were grades assigned by virtue of a vote by one's peers. These are all much more reflective of the world at large, and yet we depict it as somehow more fair to create an artificial and fully controlled environment in which to assess something as nebulous and changing as learning.

So long as we think of learning as though it were some sort of legal system, then we are constrained under Solon's legacy. But if we can see learning as something else - something more personal than social, something more creative than cognitive, something more ephemeral than physical, then we can see that the rule of law has no more place in learning than it does in thought, speech, belief or any of the other freedoms associated with an enlightened age.

5. I offer two overtly educational resources on the internet. As much as I am loathe to be self-referential, I hold these up as counter- examples to the (now renamed) Statement 9:

a. Stephen's Guide to the Logical Fallacies - a set of resources describing the known fallacies of reason. The resource consists of approximately 60 stand-alone pages, each of which describes the essential characteristics of a fallacy.

The site does not have learning objectives; I am not prescribing some sort of attainment users of the site are supposed to achieve. Nor does it have a curriculum; users are able to pick their own path (if any) through the material (it is worth noting that there is no assessment on my site; people are judged in their own environment by admittedly ideosyncratic criteria by their peers as to whether they are 'logical' or not).

Such an organization of learning material is common on the internet; my site is nothing unusual, except perhaps by virtue of its age.

Now in order to defend Statement 9 it must be argued that either this site is not educational, despite being used by hundreds of thousands of people for precisely that purpose, or it must be shown that it does contain learning objectives and a curriculum, despite the author's avowal that it doesn't.

b. OLDaily - this is a daily email newsletter supported with a website and knowledge base of archived materials. OLDaily was designed to facilitate the continuing development of e-learning professionals. Its contents are directed toward the topic of online learning, though that topic is left undefined and has been seen to include pictures of snow crystals, among other unusual resources. yet to see Again, except for the fact that it is promised to be delivered on weekdays, OLDaily has no curriculum. Nor either does it contain anything resembling learning objectives. Indeed, it is used as an educational resource only by a portion of its readership; others consider it part of the work environment.

As above, in order to support Statement 9, it must be shown that either OLDaily does not provide an education, in spite of manifest indications otherwise, or it must be shown that it embodies a curriculum and learning objectives, in spite of the author's stated report that it contains neither.

4. Some Notes

From Mary Hall:

I've a couple of questions / thoughts in response...

I - I think we need perhaps to distinguish between 'learning' and 'education'?

Some quick and rough distinctions:

Learning = the acquisition of new knowledge, where knowledge is information that is acquired, evaluated and integrated

Education = (1) a process that supports learning, or (2) the outcome of that process (as in 'an education')

Surely, though, the concept of 'education' includes an implication of purpose? (Back to the old Latin root, as I learned it e ducere [ducare?]:to lead forth.

The ancient Romans got a lot of things wrong, and they never did discover electricity. And their civilization fell. So we need to take Latin roots with a certain degree of scepticism.

That said, yes, it could be said that education has a purpose: to foster learning. Usually people have a certain purpose in learning as well, a certain reason for wanting to acquire and use new knowledge.

But in my previous post I very deliberately compared education with other freedoms. As Mill defines utility: the pursuit of one's own good in one's own way. The concept of utility implies a purpose, but it does not follow that a particular purpose (not even 'happiness') is inherent in the definition of utility.

In our traditional understanding of education, the purpose of learning is defined by an external agency: one's parents, the Church, the State, the corporation. This is so entrenched it is difficult to conceive of education without an externally defined purpose. And therefore, it makes it difficult to define it without an institutional structure.

If we make this distinction, and place 'education' as a subset of 'all learning' then I think the difference in perspective between your comments and Mark's are largely explained? It also would allow for the the assumption some of us seem to be making, that 'education' tends to imply a degree of 'formality'.

Education is not a subset of learning; that is a category error. Learning is a process of a specific type; education is something that facilitates that process. Learning is an event; education is a catalyst.

If this concept of "feral learning" describes the individual's natural learning process in a de-institutionalised environment, (eg 'grazing' as opposed to lesson-sized 'mealtimes') - is this akin to what you are putting forward, Stephen, as 'education'?

I didn't participate in the feral learning discussion. But...

What I am talking about I would be hard pressed to describe as anything like 'natural learning.' It seems to me that feral learning would be learning that takes place without any process intended to facilitate this learning. It would be, as the name suggests, learning that we would obtain no matter what, learning that would occur in the absence of any teacher, in the absence of any education.

But the non-institutional learning I am talking about isn't like that. Such learning is facilitated. But it is not facilitated by a certain structure or institution. In some cases it is facilitated by the self; I deliberately undertake a self-education process. In other cases it is facilitated by external (but non-structured) resources.

Someone in another post compared the learning resources I described as being akin to books. In one sense this is true, but only in the sense that coal can be compared with rocks. Some books can provide an education; they are specifically designed for that. Other books are indifferent insofar as facilitating learning is concerned. Still others (Heidegger comes to mind) are hostile to learning.

The resources I described were created with education in mind; they are intended to facilitate learning. That is the reason for their being and the genesis of their design. Just so, they could be

compared with books: but the interesting question is: with which books?

5. Freedom in E-Learning

From Grant Sherson:

Am I right in thinking that Stephen Downes suggests that a formal curriculum is old hat? If I was learning to be a mechanic and had all the resources I wanted in front of me but no specified outline of what I needed to know - I would never be sure I knew enough to set up a garage and offer my services. I may have big holes in my learning and I would be afraid I would make costly mistakes. I would have no way of knowing whether I knew enough or not. There is no freedom in that!

To restate my point more clearly:

- Not all learning is like learning to be a mechanic
- Not all people studying auto mechanics want to set up a garage

In a formal program of study, as is assumed in this counterexample, a formal curriculum is required. But not everyone wants a formal program of study. Sometimes people just want to know enough to tinker.

The Regina Declaration

This article is a compilation of my contributions to the Commonwealth of Learning conference on copyright

Closing Comments

I am finally home from my trip, just in time for the end of the copyright conference. Three weeks is such a short span for such a large issue; there is a great deal I would like to have addressed, and so few hours in which to address it.

This morning the fire alarm rang in my Ottawa hotel at five in the morning, having as a result not only our evacuation of the building but also my viewing of a legal affairs show on [CBC Newsworld](#). It was an unfortunately one-sided presentation, featuring a long discussion with a representative from Access Canada on the need to extend and enforce copyright.

Between the tired old arguments (cribbed from the usual sources), however, was a picture of life under the new regime. We saw the representative spy on and bait photocopy shops. We saw an expose of schoolchildren basing a musical revue on a protected poem. We heard about buskers being shaken down for royalty payments. A parent unable to photocopy a picture of his own child because he could not prove he owned rights to the photo.

Never mind all the rest; I have only one question: is this the sort of society we want to live in?

The Business Software Alliance was caught this week flagging copies of Open Office as copyright violations, sending email to system administrators demanding immediate action. Open Office is, of course, a popular and widely distributed open source application, but as the BSA robot peered into FTP sites it could find on the internet, it flagged every instance of the word "office" [as a violation](#).

I could go on and on. Ebook readers that say it's illegal to read public domain literature to your kids. Harassment and lawsuits designed to curb fair and free criticism. Arbitrary jailings (yes, this has happened). Universities being urged to act as enforcement agencies. And on and on and on.

Yes, of course schools, colleges and universities should obey the law. That was never at issue. And of course the authors of genuinely original content, wherever it is placed, should be protected from uncompensated commercial exploitation of their work. That was never at issue either. Nor were the numerous straw men tossed our way throughout this debate. Yes, works should be attributed. Yes, plagiarism is academically dishonest.

The substantive issues in this conference revolved around two major themes: first, the burden that contemporary copyright legislation (in its many and sometimes bizarre incarnations) places on academic institutions, especially those in the South, burdens revolving not only around price (though this is far from trivial) but the requirements of licensing and reporting. Nobody really came to grips with the fact that the cost of content to educators, whether that content is online or off, is far greater than the actual value of the material in question.

But second, even more importantly, this conference was unable to come to grips with the

essential changes to society being wrought by recent legislation and recent enforcement practices. Though some people tried, I saw the discussion turned back again and again to legal issues, matters of interpretation, and similar trivia. Such discussion, offered mostly by copyright lawyers seeking to profit from the endless litigation the current regime provides, failed utterly to come to grips with the deeper social changes and social costs being extracted by the recent practices.

In an article a couple of weeks ago the Guardian's [John Naughton](#) takes on the issue. He writes, Pretending that intellectual property is the same as any other kind of property is deeply misleading. For while there is clearly no gain to society from plundering other people's physical property, there is clearly a social benefit from the wide dissemination of intellectual property - ie ideas and their expression. As Picasso said - and Steve Jobs famously repeated when explaining how the Apple Mac came to bear such a striking resemblance to the Xerox Alto - 'minor artists borrow; great artists steal'. We make progress, as Newton observed, because we are able to stand on the shoulders of the giants who went before us. Even Walt Disney lifted the idea of Mickey Mouse from Steamboat Willie."

What is at issue here is not the protection of the authors' incomes. That was never in doubt; authors prospered long before 1710, they prosper in the open source community, and the vast majority of us make do without collecting a dime from royalties. No, what is at issue here is the very nature of the creative process, the question of whether it is legitimate to progress at all through the work of those who came before. Every time I hear someone remind me that aspirin or xeros or coke are brand names, and must therefore be capitalized, I am again faced with this essential conundrum.

In a free society, Lawrence Lessig reminds us, the future builds on the past. In a less free society, the past tries to control the future. And, [observes Lessig](#), ours is a society that is becoming less and less free.

What is at issue here is not a question of dollars and royalties, at least, not directly. What is at issue here is a matter of power and control, a matter of freedom. And while copyright lawyers may rail at us from their comfortable offices, it remains true that our understanding of the nature of society, not their understanding of legal nuance, is what in the end must decide the matter.

So I ask again, what sort of society do we want to live in?

The real decision facing educators today has nothing to do with whether or not to comply with copyright. It has nothing to do with the subtlety of copyright legislation at all.

It has everything to do with whether we are willing to accept the continuing constraints on our education system. It has everything to do with whether we continue to rely on commercial publishers at all, whether we begin to reclaim our common cultural, scientific and social heritage, the basic elements of an education that is every person's right. It has everything to do with whether we are willing to allow private, commercial, interests to own, monitor and control what is read and studied in our classrooms.

Or whether we want to be free. As in freedom.

Open Access Initiatives

It seems to me that the best means of approaching the problem of obtaining educational materials from publishers and other sources is to circumvent these sources. These publishers prosper because they have an effective monopoly on educational content. What is needed is to break this monopoly, to create an open archive of all the materials needed to provide an education, and to create world-wide access to this archive.

Publishers are able to prosper despite creating rules and barriers that hinder the provision of an education. They prosper because we continue to pay them for educational materials. What is needed therefore is for public enterprises such as schools, education boards, colleges, universities, and government departments to fund the development and distribution of open educational materials, rather than to continue to struggle against publishers' constraints.

The situation with regard to educational materials is analogous to the situation with regard to academic journals. The cost of journal subscriptions has driven many college and university libraries to desperation. Articles in journals, though produced by academics without compensation from publishers, and therefore paid for from the public purse, cannot be accessed by other researchers or by students without the payment of considerable subscription costs and without submitting to onerous licensing conditions.

In order to counter this, one year ago this week the Budapest Open Access Initiative was formed to promote the development and distribution of open access academic journals. It allows content producers - such as university professors - to make the choice to make their article freely available to anyone who would like to read it. The technology needed to support such an endeavour is being created by the Open Archive Initiative, a project designed to create software for the creation and use of open archives of publicly accessible materials.

There are excellent reasons to suppose that a similar initiative in the field of online learning would be worthwhile. With contributions of educational content produced by teachers, professors and government agencies from around the world, an open educational resources initiative could provide a much needed base of free resources that could be used by educators around the world. Already work has been done by developers involved in the Open Archives Initiative to support the creation of archives that conform to the Instructional Management Systems specifications, allowing for the easy location of educational materials through a network of open archives.

Some resources:

Budapest Open Access Initiative - [Home](#) - [FAQ](#)

Open Archives Initiative [Home](#) - [Application](#) - [Article](#) - 'Superarchives' Could Hold All Scholarly Output -

OAI and Educational Materials [Paper](#)

The Regina Declaration

Though some believe that the conversation is turning toward an acceptance of existing copyright regulations, what we have seen in this discussion resembles more a list of horror stories from working within that environment than it does any genuine desire to work within its constraints. It seems clear from the discussion in this forum that existing copyright rules and regulations - and

the resulting corporate and institutional practices around those rules - are hindering education to a significant degree.

Instead of fighting against copyright, a fight that can only be fought on grounds already owned and occupied by traditional publishing interests, we must work toward the goal of making traditional copyright irrelevant. We are, collectively, able to harness the greatest wealth of intellectual and technological resources available to humanity; we already have these resources at hand, and need only direct them toward a single end.

It is within our grasp, if we assert only the will, to provide in full the resources needed to provide an education for every person on the planet. I submit that it is toward that objective that our discussion of copyright should direct itself.

So, what is needed? With due recognition of the location of the moderators (at least one of them), and therefore the virtual physical location of this conference, I offer the following for consideration and, if appropriate, support:

The Regina Declaration

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1. We must stop paying for educational content.

I don't mean this in the contentious and probably illegal sense. What I mean is that schools, colleges and universities must stop purchasing learning materials from traditional publishers. Just as, in the field of academic publishing, there are thousands of freely available refereed journals available on the internet, so also, with time, will there be a substantial body of educational resources available on the internet.

Thus, just as (and in the same spirit as) many schools and institutions are now turning to open source software, our schools and institutions must begin to turn to open educational content. Nobody pretends that this can be done overnight; content will not be produced until it is clear that schools and institutions will begin to use it. But where the choice exists, our institutions ought to opt for the non-commercial and non-encumbered open content.

2. We must keep the internet free

The internet was originally built as an educational and research network. A commercial presence was allowed, with much reluctance. But the posting of commercial content has created a legal nightmare for the original users of the internet, as it is no longer clear whether resources may be viewed, much less linked to, described, quoted, or copied.

The presumption must be, if content is posted to the open internet, it was meant to be shared. The open posting of content on the internet should be interpreted as the equivalent of the provision of GNU Public Licensing. Numerous and efficient mechanisms exist for commercial content providers to protect their content from open viewing. The intent to protect and prohibit the use of online content should not be inferred unless some measure is taken to establish such limitations.

3. We must stop interpreting copyright legislation in the rights-owners' favour

The tendency among educational institutions is and has been to play it safe, to protect themselves by assuming a level of protection for materials greater than that established by law. Thus we see in this conference the fear that a mere link violated copyright. Thus we see prohibitions on the use of any copyright content, even if that use is allowed by law. Thus we see measures taken against software that might be used to violate copyright.

Educational institutions, especially public institutions, should firmly establish and defend their right to use copyrighted content. Where a right exists in the non-digital environment, it should be asserted in the digital environment. If a video may be shown in a class, it may be shown to a class online. If a book may be circulated through a library, it may be circulated through an online library.

4. We must stop clearing copyright

By this I do not mean that we should simply use content contrary to existing law. But that what I mean is that educational institutions should stop doing the publishers' jobs for them.

Educational institutions spend thousands, perhaps millions, of dollars clearing copyright and arranging for the payment of royalties for content used in the classroom or by students in the course of their studies. This is a task, and a cost, that should be assumed by publishers. After all, it is the publisher, not the educational institution, that profits from the sale of this material.

Educational institutions should declare an intent to cease clearing copyrights at a specified time. Insofar as copyright material is used in classes, online or offline, it should be content that can be accessed, and if necessary, purchased directly by students. In such cases where this access is not available, the content should not be used.

Related to this point, and integral to it, is the contained proposition that educational institutions, school boards, and governments should cease the practice of purchasing bundled software licenses for entire student populations. Such licenses, though offered under the guise of lowering access prices, serve to increase the cost of access. Though it may be true that a student may obtain access to a work for \$0.20 a title, this is no bargain if the student must pay for access to hundreds of materials he or she may never use. Such purchases distort the market for educational software, eliminate competition, and make it more difficult for non-traditional students to obtain the same material.

5. We must produce open content

We currently spend billions of dollars acquiring content at inflated prices, content that is of limited utility. We must begin to redirect the flow of public funds from the acquisition of protected content to the production of public content.

It is worth keeping in mind that scholars and academics produce the content currently sold to schools and educational institutions. It is worth keeping in mind that these authors and creators receive very little, and in many cases nothing, from the publishers. It is worth noting that these authors typically surrender all rights to this content, both legal and moral rights, to the publishers. And it is worth noting that these authors are paid from the public payroll to produce this content.

We can offer authors a better deal, unequivocally protecting their moral rights while providing some financial compensation, if required, for the production of academic content intended to be

freely and openly shared. Content released under such conditions should be the grounds for the highest academic honours, promotion and tenure, rather than overlooked and undervalued. A professor's free website or digital archive should be the primary constituent of evaluated data, not an afterthought.

After all, insofar as the public supports or subsidizes the educational system, it is fair and reasonable that the public value more highly the contributions of those members of the system who work in the public interest, as opposed to those who work merely for personal or private gain over and above their institutional salaries.

6. We must distribute open content

We should set as a priority the creation and management of a free, open and public network of educational content repositories. The basic mechanisms for these repositories already exist; we need only build on existing work and dedicate ourselves to the task of providing access to free educational content for all.

7. We must protect open content

As Carol Fripp mentioned in a previous post, we need "a legal framework to ensure works, many of which are basically free, are not subsequently commercialized and exploited." The commercial sale of open content is not in itself a problem; we see many examples where this works quite well, as in the case of Red Hat or the publication of classic works of literature.

Where significant disruption occurs is when commercial enterprise appropriates content or other assets from the public domain and subsequently prohibits their use. The best and most infamous example of this is the celebrated conditions attached by Adobe to the use of "Alice in Wonderland," including the stipulation that the work shall not be read aloud.

A branch of government or of various educational institutions must be established to act as an advocate of the public domain, to collect and catalogue open content, to respond to claims of ownership of public domain content or other assets, and to represent the interests of the public in matters where disputes arise. Where there is no defense of the public domain, there is no effective public domain, and the continuing looting of traditional knowledge and culture will continue unabated.

Design, Standards and Reusability

1.

In 'Connecting Instructional Design to International Standards for Content Reusability' Michael D. Bush (2002) emphasizes two major points: first, that standards are essential in order to achieve widespread educational content interoperability, and second, that efforts are underway to associate existing standards efforts with principles of instructional design. His article is based in discussions at the ID2SCORM [Footnote 1] conference held in Utah last year, where participants adopted and forwarded both points.

The argument in support for world-wide standards for learning content is a familiar one. Bush cites examples from the early days of the industrial age, such as the need for consistent fire hose connections, or the need for a common railroad track width, in order to show that a failure to adopt standards is both prudent and efficient. The adoption of e-learning standards, he suggests, is also consistent with existing efforts to design instructional materials that could be used by many colleges and educational institutions. Hence he and his colleagues turned enthusiastically to SCORM, a standard developed by Advance Distributed Learning for the U.S. military, and hence, widely used by both universities and corporations.

A certain degree of vagueness exists within SCORM, however, and Bush notes that the standard leaves questions such as the definition of a 'learning object' and the appropriate granularity of such materials unanswered. For example, to cite an oft-quoted difficulty, sharable content objects (SCOs) within SCORM are expected to be independent of learning contexts, and yet, at the same time, be used in learning. The challenge, he suggests, is to create media that are at the halfway point between individual media objects on the one hand and a full course on the other.

Though learning design was deliberately left out of SCORM, he observes, there is some commitment to include it in the future, and it is with this in mind that the participants of the ID2SCORM conference convened. Learning design has been approached in other standards efforts, most notably Europe's Educational Modelling Language and the Instructional Management Systems's Learning Design specification. But these efforts, he argues, are missing support from recognized instructional design experts, who, collectively, would be able to describe how content and instructional strategies may be represented, how popular learning theories may be expressed in software, and how interactions between learners and instructional systems may be represented.

2.

In what is a bit of a misuse of the term, instructional theorists have been talking about the instructional 'contexts' of learning objects. One might think of an instructional context as the manner or way in which a learning resource will be used to foster learning. An instructional context thus defines the relation between resources with each other, such as the manner in which they are sequenced or presented to the learner. Alternatively, an instructional context may define the role that a given resource plays in a learning scenario: it may be an illustration, an example, an explanation or an exegesis, for example.

In the design of learning objects, and in e-learning generally, the definition and location of the instructional context becomes a central question. For an object to be used in learning, it must be

used in some specific way, and arguably, it is not a learning object (as opposed to a mere content object) unless the definition of the object in some way also describes the manner in which it is to be used. As various commentators have argued, a mere picture is not a learning object because there is no instruction inherent in the picture. Presented merely with the picture, one has no real idea what to do in order to use it to advance learning. The presentation of a picture, therefore, must be accompanied with some context. The context would describe what is to be learned from the picture, and possibly, suggest ways in which this learner must be accomplished.

Instructional design theory is in a nutshell the study of instructional context. It considers different ways of presenting different types of materials, and different uses to which these materials may be put, in order to foster learning. Although instructional design is typically practiced in concrete form, as in the actual design of an online course or program, the theory approaches this topic in the abstract, suggesting methodologies that may be used in a wide variety of circumstances. It is understandable, then, that one would see a natural fit between learning objects, which are supposed to be reusable, and instructional design principles, which are also supposed to be reusable.

At its simplest level, instructional design theory may be thought of as a series of instructions to teachers. "First, present the learning objectives (which are grounded in associated competencies," the theory might say. "Then provide some concrete examples (preferably rooted in the students' own experiences or culture). Following that, draw out the generalizations inherent in the concrete examples and show, through a demonstration, how these principles may be applied in a larger number of circumstances. Provide some exercises in which the principles are applied in additional circumstances. Finally, depending on the educational level desired, test for the student's ability to remember the examples, to remember the principles, or to apply them in novel circumstances."

3.

Of course instructional design theory in practice is much richer than the simple example provided. It elaborates on the types of materials appropriate for each activity. It shows how the activities flow from one into the next, and how an internal consistency is maintained from the initial assessment of learning needs through to the metrics employed in the final testing process. But most importantly, a more mature approach to instructional design will inform the designer of means and methods to anticipate, and design for, variable circumstances.

For example, given the same instructional material, one student may successfully acquire the concepts and demonstrate the associated competencies, while another may fail. At the conclusion of the test, or at the conclusion of intermediate assessment stages, therefore, a point of decision is reached. If the student has failed to acquire the previous material, then it makes no sense to proceed to new material. Minimally, the student must loop through the instruction and try again. Consequently, a major component of any theory of instructional design will revolve around the definition, capture and use of interaction between the student and the instructional material.

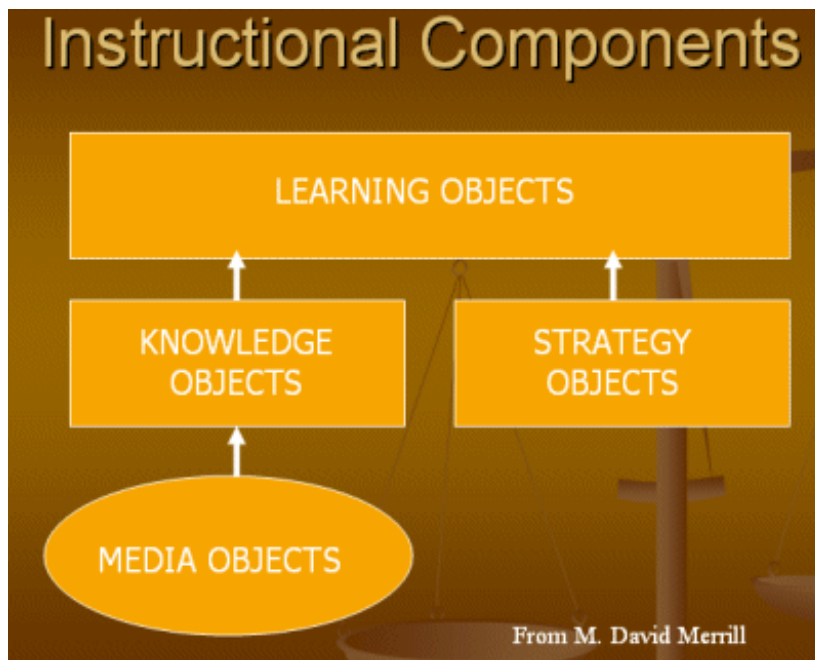
Another major component of instructional design involves prior assessment or pre-testing. Before any instruction is attempted, the student's ability to demonstrate his or her competencies is assessed. Based on this assessment, a selection of a set of appropriate instructional materials may be made, so that the student's time is spent in the acquisition of new knowledge, rather than the mere rehashing of previously acquired knowledge. Alternatively, an instructional system may query the student regarding what sort of learning he or she would like to undertake, and based on the student's selection, present the appropriate instructional content. While the previous sort of

design created loops, these designs create branches.

Another type of decision revolves around how the learning content is to be presented. The same content may be presented in different ways. The medium employed may vary: a student may be asked to read some text, to listen to an audio tape, to view some pictures or to watch a video. The language of the presentation may vary, from very simple for young learners or those just learning a second language, to very advanced for the adept. The pacing of the presentation may be speeded or slowed. The manner in which the presentation is approached - expository, explanatory, descriptive, argumentative - may be varied. Any of these decisions may in turn be based on properties of the material (is it easy or difficult, concrete or abstract, cognitive or affective) or on properties of the learner, sometimes described as their 'learning style'.

The point here is that instructional design may be characterized as a set of decisions regarding the type and order of the instructional content to be presented. Whether the instructional content be, in one instance, a classroom discussion revolving around a certain theme, or in another instance, a series of self-study exercises, or in another instance the reading and summary of a body of text, in each case, an argument needs to be made showing why this material, in this context, for this student, ought to be presented. And instructional design theory, in its grandest (and most futile) sense, is the advocacy of universal principles by which such decisions may be made.

This diagram (Anderson, 2002) is typical of the model (the terms may change, but the principle remains the same). Objects and strategy, joined, yield learning:



4.

The question of which educational resource (whether it be a knowledge object, learning object, or whatever) to use in a given instructional setting appears to be an open ended one. But in fact, the range of options is surprisingly narrow. Even in a world of a million learning resources, if we know what topic, level, lesson and language we are using we could narrow the field of possible

candidates to a dozen or so. It becomes possible, even with such a crude characterization, to imagine simple rules for the selection of material.

This is, in fact, the approach taken in learning design. The IMS Learning Design specification, for example, is characterized in terms of what are called 'condition-action' rules. The 'condition' is a specification of the values of one or more properties in the learning environment. The action is the specification of what resource to launch (or what task to undertake) should the statement contained in the condition be 'true' at the time of assessment. At any given decision point, therefore, a set of conditions is evaluated, and depending on the result, a given action is undertaken.

This logic may be seen clearly in the IMS Learning Design specification. Consider the following extract (edited for clarity) from one of the examples:

Top of Form

```
<imsld:if>
<imsld:is>
<imsld:property-ref ref="P-Hazards-
Lesson-Was-Last"/>
<imsld:property-value>true</imsld:proper
value>
</imsld:is>
<imsld:then>
<imsld:show >
<imsld:learning-activity-ref ref="LA-
knowledge-test-components"/>
</imsld:show >
</imsld:then>
```

Bottom of Form

We can see that in the 'if' statement, we test to see whether the hazards lesson has just been completed. The action that follows is the showing of the next bit of instructional content.

The bulk of the Learning Design specification is devoted to clearly defining the sorts of conditions that could obtain. This includes the description of roles, the description of an environment, and the creation of certain properties. This is the core of learning design:

properties and conditions, and notifications are required. Levels B and C of the Learning Design Specification provide these. Properties, specified at Level B, are needed to store information about a person or a group of persons (role). So for a student its progress may be stored, perhaps in a dossier; for a teacher information on papers graded may be stored. Conditions, also part of Level B, constrain the actual evolution of the didactic scenario. They are set in response to specific circumstances, preferences, or the characteristics of specific learners (e.g., prior knowledge). An example of a condition would be 'when the learner has learning style X, present the activities in random order'. The idea is of course that randomness allows the student to freely explore the materials. Notifications, specified in addition to the properties and conditions of Level B at Level C, are mechanisms to trigger new activities, based on an event during the learning

process. For instance: the teacher is triggered to answer a question when a question of a student occurs; or the teacher should grade a report, once it has been submitted. (IMS, 2003)

(It should be noted that when the IMS learning Design specification uses the word 'condition', it is referring to the entire conditional statement, and not merely to the antecedent ('if') part of the statement.)

What learning design buys the instructional designer is flexibility. A lot of flexibility. Given the same set of learning objects, for example, two very different types of instructional material may be created by using two different learning designs. Even within a single learning design, the presentation of material for a given student may be changed by changing the role of the student. And even within a single role, the presentation of material is changed depending on the student's interaction with the material, or by instructor intervention.

But it buys this flexibility at a price. And it is arguable (and I would argue) that the price may be too high.

5.

We begin to see where Learning Design goes astray when we consider the reusability of a given learning design.

By hypothesis, let's consider a simple learning design, which can be characterized informally as follows:

Show the learner a learning object. Then give the learner a test. If the learner passes the test, then show him a new learning object. Otherwise, show him the first learning object again.

Without getting into the details of how to express this design in IMS Learning Design, we can see that it is a reusable learning design. It is reusable because we have not specified which learning objects or tests are to be used. The design, as expressed here, is an abstraction. It could be used by any number of designers in any number of settings. In fact, it is possible to see just this sort of description offered in any number of learning design documents.

How this would work is also straightforward. The instructional designer would select, from a repository, one or more learning objects. The instructor would select a learning design. These would then be bundled together to form a learning package. The completed entity would then be stored or shipped to the eventual end user. It is possible even that some designers may contemplate the placement of two separate learning designs in the same package, to give the resulting package a degree of flexibility. Thus, the package, when run on an LMS, could, depending on (say) the student's learning preferences, select one of the other learning design to apply.

In practice, however, we see that the situation is not as it seems. Consider a more abstract representation of the same scenario.

We have three learning objects and a test (L1,L2,T) and a set of rules:

Show L

Show T

If T(passed) show L, else show L

This formalization is a bit of a caricature, but the question pops out: how do we tell the learning design which learning object to show at any given point?

No doubt this formulation has occurred to the reader:

We have three learning objects and a test (L1,L2,T) and a set of rules:

Show L1

Show T

If T(passed) show L2, else show L1

And, indeed, this would work. But, importantly, it assumes that the learning objects have somehow been named in the learning design.

As we look again at the examples offered in the IMS specification, we see that this is exactly what happens. Look again at the sample XML markup:

Top of Form

```
<imsld:if>
<imsld:is>
<imsld:property-ref ref="P-Hazards-
Lesson-Was-Last"/>
<imsld:property-value>true</imsld:proper
value>
</imsld:is>
<imsld:then>
<imsld:show >
<imsld:learning-activity-ref ref="LA-
knowledge-test-components"/>
</imsld:show >
</imsld:then>
```

Bottom of Form

As we can see, in both the condition and the action, a specific learning object is named.

And if a specific learning object is named, then the learning design is not reusable. It can only be used in that precise context where the learning objects in question were (from the example) 'P-Hazards-Lesson' was the last lesson, and 'LA-knowledge-test-components' is the current item to show. This learning design cannot be used anywhere else except in this specific course.

It is tempting at this juncture to consider various approaches to the resolution of this dilemma. For example, instead of referring to learning objects by name, perhaps the learning design could refer to them in order. Thus, the conditional statement might read "If the student has passed the first test, then show him the second learning object; otherwise, show him the first." But this merely pushes the problem back one step: at some juncture there would need to be a specification of the order of the learning objects, and this order would have to refer to the learning object by name.

Another possible approach is to try to specify the rule by appealing to some property of the learning object. For example, the rule might read, "If the student passes the level 2 test, then show the student the level three object, otherwise show him the level two object." But this merely pushes the problem of specification into the learning object itself; the designer of the learning object would have to know that this is a 'level two' object, with respect to this learning design, and code it into the metadata. If the designer referred to an external schema or ontology to specify level (or some other property) then the learning design would be tied to that particular schema or ontology, and once again, would not be reusable across contexts.

There is, I submit, no way out of this problem. In order to use a learning design with a set of objects, the learning design must specify the objects to be used, and if the objects to be used are specified, then the learning design is not reusable.

6.

Having described the problem, let me now add a few words about the only way in which a learning design can be used. In a nutshell, learning design requires a designer.

The following scenario may be imagined. A learning designer is working in an integrated development environment. She conducts a search, based on a prior knowledge of the topic to be studied and the level of the student. She then selects from a list of learning designs, and then (maybe using drag and drop) moves each of the selected objects into the (blank) learning design template. The resulting product is a completed learning design that specifies each object to be used. This is then packaged and shipped.

It sounds like an appealing prospect, and no doubt software designers are already implementing this methodology. However, it must be noted, first, that the designer must already know the design, and second, as noted previously, that the word of the designer cannot be re-used. It's a labour-intensive one-off production, and therefore hardly an advance over having the designer create a customized course from scratch.

The designer needs to know the design in advance because she must know where to place each learning object into the design. Thus, for example, she must know that L1 comes before L2 in the sequence of events. This means that not only is the design process labour intensive, also, it must be implemented by a subject matter expert. And it is still not reusable. Moreover, the more detailed the design, the more the designer must know about not only the field, but also about the pedagogy behind the design.

So while it is clear that the learning design specification can indeed be used to create learning packages, it should be clear that:

The learning designs themselves are not reusable in any meaningful way

The completed package is not reusable at all

It seems, therefore, that the project envisioned by the ID2SCORM group is doomed to failure, not in the sense they they could not accomplish the task - of course they could, as just described - but in the sense that the task, once accomplished, will not have produced a system or methodology of any meaningful value.

7.

In my opinion, this is a defect, not in the intentions and deliberations of the ID2SCORM group, but a flaw inherent in the concept of learning design itself.

Expressed generally the flaw is this: Learning design and reusability are incompatible.

Design requires specificity, and specificity prohibits reusability. Or conversely, Reusability requires generality, and generality prohibits design. It's an all-or-nothing proposition. If you want to tell your students what to do and when to do it, then you must tell your students what to do. But the minute you tell them what to do, you have precluded the possibility of telling them to do something else.

The director of a play cannot on the one hand instruct an actor to say "To be or not to be" while at the same time leaving it open for the actor to say something else. And if the director leaves the options open, then the actor does not know whether to say "To be or not to be" at any given time.

So where to now?

That is, of course, the subject of another paper. But essentially, the solution requires the embrace of one or the other of the horns of the dilemma. And that is what we are seeing more and more in the field.

As some commentators have already noted, we are beginning to see less and less talk of re-use in online learning. Indeed, as Patrick Lambe suggested in an entirely different context, what we are after is not reusable objects, but disposable ones. This, it seems to me, is the approach favoured by more and more institutions and corporations, as they begin to look at an instructional design system, not as a means of reusing objects, but as a means of producing them to be used once, then discarded.

In my own work, I have embraced the other horn of the dilemma. That is, I believe that - for reasons of cost and accessibility - reusability is still an attainable goal. However, it means that, in order to achieve this goal, the idea of reusable learning design must be jettisoned. So, in a sense, what I am arguing for is disposable design, that can be created once, as needed, and then discarded, never to be used again.

Such an approach to the dilemma, of course, shoots an arrow straight into the heart of the discipline known as instructional design. It suggests that, at some fundamental level, instructional design is not about considering different ways of presenting different types of materials, and different uses to which these materials may be put, in order to foster learning. It is not like

presenting a series of instructions to teachers (now some people may say that this was the case all along, to which I must ask, what is the IMS Learning Design specification, then, if not that).

In my view, the difference between the two horns of the dilemma is the difference between writing a play and creating a game. It is the difference between telling people what to do and when to do it, and creating an environment where people decide for themselves what to do and when to do it. It is the difference between requiring a director and requiring a coach. It is the difference between giving a person directions to the Forum and giving them a map of the city and letting them choose their own route.

And - crucially - it is in my mind the difference between the way learning was and the way learning will be.

Footnote 1: The ID2SCORM conference home page is <http://moliere.byu.edu/id2scorm/> - incredibly, a Google search for the conference (as of this writing) reveals exactly seven results. Only one of the conference presentations was online. Bush's article, to which this article responds, is not available online.

Anderson, Thor. 2002. [Efficient Development through SCORM Standards](#). ID2SCORM.

Bush, Michael D. 2002. Connecting Instructional Design to International Standards for Content Reusability. Educational Technology, November/December, 2002.

IMS Global Learning Consortium. 2003. [IMS Learning Design Best Practice and Implementation Guide](#). Version 1.0 Final Specification.

Lambe, Patrick. 2002. [The Autism of Knowledge Management](#).

Meaning, Use and Metadata

[This item](#) (Symbol Grounding and Namespaces, by Phil Windley) reminds me again of some unfinished business, the reason why I was reading Ludwig Wittgenstein the last few days of my Vancouver trip.

And yes, it has to do with RSS, but only indirectly. It rather has more to do with the [Semantic Web](#) as a whole. Here's how Phil Windley put it:

When I see how do I know what it means? As Jon has pointed out, this is where things get tricky. When we use the word "means" we usually think of some rigorous, complete definition. Its fairly easy to see how namespaces might provide us with more metadata and thus increase the information we have available to us about any given XML document. Its much harder to imagine that machines will be able to divine the meaning of the document no matter how much metadata you include.

I have been witness to, either directly or indirectly, a fair number of metadata initiatives recently. Many of these, like [CanCore](#), are intent on fixing the meaning of the tags. They want to tell you, for example, what the range of allowable values is, what it means to select this option rather than another. And so we get to the heart of what we really mean by "typical age range" and other things. Right?

Well, not so. Confusion abounds, ranging from the minor (is it proper to separate the names in the 'creator' field with a semi-colon or a comma?) to the major (does the term 'creator' refer to the author of original content or to the finished product; or does creator denote the institution rather than the author when the work is work for hire) to the really obscure (does the 'URI' point to the resource itself, or can it only ever point to a representation (eg., an HTML version, a WAP version) of a resource?).

Some of the web's heaviest weights have been pondering this sort of issue. Tim Bray [writes](#),

At the end of the day, markup is just a bunch of labels. We should be grateful that XML makes them (somewhat) human-readable and internationalized, and try to write down what we want them to mean as clearly as and cleanly as we can, with a view to the needs of the downstream implementors and users. But we shouldn't try to kid ourselves that meaning is inherent in those pointy brackets, and we really shouldn't pretend that namespaces make a damn bit of difference.

He asks, [where does metadata come from](#) and, in another post, discusses the [deep confusion](#) web architects have when considering some of the fundamental issues.

Everyone agrees that when you get confused about what's being identified, this is a bad thing and makes the Web less useful. As TimBL has said repeatedly: a resource can't be both a person and a picture of a person. Unfortunately, such ambiguity is not a condition that Web software can detect.

Some of the web's problems can be solved through traditional means. Many of the paradoxes that arise, I wrote to him in a letter just prior to my Vancouver trip, are a result of [Russell's Paradox](#) - they are the modern-day equivalent of coding the sentence "this sentence is a lie" into metadata, and can therefore be solved by Russell's [theory of types](#). Create a convention, whereby references

of the form "about=URI" always refers to metadata, while "" always refers to the resource itself.

But the problem, though address, is not solved. You cannot enforce such a convention, you cannot make it that everyone will code this way. When faced with a URI, a computer system will always have to dereference it (that is, request the file, open it up, and look inside) in order to determine whether it is metadata, HTML or an image. It's like Wittgenstein [says](#),

I think there cannot be different Types of things! In other words whatever can be symbolized by a simple proper name must belong to one type.

The same dispute arises in the field of ontology. A month or two ago I was involved in a dust-up on the [Semantic Web](#) mailing list. The question centers around whether the Semantic Web should have [one upper level ontology](#) defining basic types and classes. Sounds great... but how would you decide what the entries were?

I [wrote](#),

Disagreements in language can be traced to disagreements in a wide variety of underlying hypothesis, among them including ontology (Quine), causation (Hanson), explanation (van Fraassen), categorization (Lakoff) and meaning (Wittgenstein). These five factors (among others) create a context of discourse, and it is the context of discourse (the 'pragmatics' (Morris)) that changes the meanings of the terms in question, changes the very language of discourse. Because there is no way around this (aside from a regime of ontological authoritarianism) any system of representation must adapt to this, learning, deploying, and teaching new vocabularies, new semantics, as the need arises.

And why do I say this? because if we don't, we get right back to [Russell's Paradox](#) again:

By the 'empty node' do you mean 'nothing' or do you mean 'the empty set'? Nothing, as in the absence of a thing, or empty, as in a(n imaginary) container with no members? If we take the empty node, and place it inside a similarly empty node, do we now have the equivalent of one of the original empty nodes, or do we have something that is now a non-empty node?

And I think that the debate over the meaning of metatags, of reference and dereference, of upper level ontologies, resolves to this:

We can have first principles if we wish, but first principles are not matters of discovery, they are matters of agreement, and on some things - even so simple as the characterization of nothing - there may not be agreement, not, at least, if both parties to the discussion understand what follows from such first principles. Experience is like a large jigsaw puzzle, all the pieces scatted on the table in front of us. Some people insist that the only proper way to start is with a corner piece. Others prefer to start at an edge. Others prefer to find pieces of similar colour, or similar shape, and build from within. In jigsaws, this is no problem. In experience, if you start in one place, you get one picture, and if you start in another place, you get another picture. Which picture is 'correct'? There is no way to tell: all we have is experience, and ways of putting it together.

All of which returns me to Wittgenstein.

In the *Philosophical Investigations* Wittgenstein [writes](#), "For a large class of cases--though not for all--in which we employ the word 'meaning' it can be defined thus: the meaning of a word is its

use in the language."

What does this mean?

Knowing the meaning of a word can involve knowing many things: to what objects the word refers (if any), whether it is slang or not, what part of speech it is, whether it carries overtones, and if so what kind they are, and so on. To know all this, or to know enough to get by, is to know the use. And generally knowing the use means knowing the meaning. Philosophical questions about consciousness, for example, then, should be responded to by looking at the various uses we make of the word "consciousness."

To take this a step further,

When a person says something what he or she means depends not only on what is said but also on the context in which it is said. Importance, point, meaning are given by the surroundings. Words, gestures, expressions come alive, as it were, only within a language game, a culture, a form of life. If a picture, say, means something then it means so to somebody. Its meaning is not an objective property of the picture in the way that its size and shape are. The same goes of any mental picture.

This may appear to be abstruse philosophy but it has practical day-to-day implications. I have, for example, been studying French recently. The study of a language, says Don Belliveau (my instructor), quite rightly, is the study of a culture. The clearest indication of this is to look at the French and the English look at the body.

In English, we write, I am sick. But in French, we write, J'ai mal (I have a sickness). In general, in English, the form of expression assumes that the body is something that we are, while in French the assumption is that the body is something we have. Now what would be the 'correct' reading? How do we define the 'self' properly, given the differences in English and in French?

There is no correct way. Neither language has a lock on the truth. Nor would an empirical investigation help: we could look at the body all we wanted and advance no further: the body itself does not tell us how to describe it, and the language we use to describe the body is itself permeated with assumptions about the nature of our enquiry. How does one study the 'self'? The same questions arise. When Descartes says, "I think, therefore, I am," he has already acquired a knowledge of I, of think, of am.

Meaning is use. What the term means is determined by how it is used. Do you want to know the meaning of the term ? Then you go and look at how it is used. yes, there may be rules, and yes, these rules may be followed, but it cannot be the case that the rules determine the use, because there is no causal connection between the rule and the use: the rule may exist, and yet, people may violate it.

To take all this a step or two further: in other of my writing, i ave been taking about the need to treat complex objects (such as learning objects) as 'words' in a new 'vocabulary' ([here](#) and [here](#)). When I say this, I mean this quite literally, which means further than when we try to attach meaning to one of these multimedia-words, what I mean is that we need to look at its use.

Right now, people are trying to determine the meaning of, say, a learning object, a priori by means of attaching metatags. The metadata, it is supposed, creates a description of the object, and

thereby, creates meaning. How do you know when to use a learning object in your course? You look at what you are trying to say and then find a learning object that matches that description.

Several metadata tags are explicitly about meaning. Tags that have to do with the topic, category or the content of an object, especially, try to fix the object into some sort of semantical space. If you are talking about 'rabbits' then this object will help you. So the theory goes.

But what rule would help us to determine whether a given learning object should or should not be used in the context of a discussion of rabbits? It should be clear that it is not going to be possible to determine this a priori. Should we use all and only those that have the term 'rabbits' in their metadata? This would eliminate those objects depicting 'hares', it would eliminate 'bunnies', and it would eliminate references of rabbits by name (such as 'Peter'). Should we look at the content? Well then this article, because of the preponderance of the word 'rabbit' in its body, will show up in the search.

The only way you can be certain that a word has a given meaning is when the word is used in some context. The only way, therefore, to determine whether a learning object has anything to do with 'rabbits' is to determine that it was actually used in that context. There is no prior determination that will tell you that this object is used correctly, or incorrectly, in that context.

Indeed, this applies to our definition and use of the general class of entities known as 'learning objects'. Rory McGreal characterizes my view as being "anything can be a learning object". It does not, of course, follow that everything is a learning object. rather, my view is that the only way we can know that an object is a learning object is that somebody actually uses it in learning.

In my view, the massive efforts underway to tag, to carefully sort, classify and describe, learning object metadata is misplaced. It is misplaced not because it is wrong or misleading (though that possibility is certainly built in by assumption). It is misplaced because such metadata descriptions can, at best, represent only one point of view of the description and the application of a learning object.

We will not be able to approach the usefulness contained in the promise of learning objects - and of the semantic web more generally - until we get past this idea that we can define it (and in passing, all of human knowledge), a priori. We can't. The very best we can do is establish (through, say, RDF) relations between intended meaning of terms. But at some point, we need to step back and observe how these entities are being used, and to capture that as our definitive metadata.

If you step back, and look at it from a wider view, it is apparent that it could be no other way. The search engines that have been less successful (Yahoo!, DMoz) have tried to categorize and rank a priori, while the most successful (Google) has ranked according to use (as instantiated in actual links).

There is a whole class of description - what I have been calling third party metadata - which aids us in this determination. The full and sole purpose of third party metadata is to capture the use of a learning object. And it is my contention that, in the long run, such metadata will be far more useful for the organizing and retrieval of learning objects than any a priori system will ever be.

PostScript

Here is the email I sent Tim Bray. I'm not completely happy with it,. For example, what i would now want to say is something like: the best evidence that something is an image, say, is that it is referred to in an image tag. But this should suffice as background.

Hiya Tim,

I've been thinking about the problem posed in your 'On Resources' bit since you posted it a few days ago. I've run through the documentation, the posts, and more. I believe I have a handle on the problem, but maybe not - groups like this tend to start talking with their own language after a short while and what I think it might be might not be what it actually is.

My vast over simplification: it is not possible to tell, from a URI, whether you are pointing to the resource itself, or whether you are pointing to a document about the resource (which, perversely, may also be a resource). "There is no way for the Web software to distinguish between an 'Information Resource' and any other kind."

It seems to me that this is an instance of [Russell's Paradox](#). The paradox occurs when you create a class of entities, with a function f that defines what entities fall into that class, in such a way that the class you just created is mapped by f to be a member of the class you just created. In the philosophy of language, this occurs when you make a statement about an element of language, where the element of language you are describing is contained in the statement you just made. Thus, a sentence like 'this sentence is false' is an instance of the paradox.

Russell's response is to introduce a theory of types. In a simplistic nutshell, instances of linguistic resources (ie., sentences) are divided into 'language' and 'metalanguage'. Now I know that in your response you reject the idea of dividing the universe of resources into two buckets. "Let's please not pretend that this distinction is fundamental to, or even noticeable in, the architecture of today's Web." But I think the other side is right here, in a sense. The distinction, true, is not a property of the web architecture, but it is a property of language in general. Language can be self-referential, and where self-reference can occur, paradox arises. Failing to address this issue at this juncture may introduce into the web architecture an incongruity that is being sensed by the members of TAG.

But what the theory of types introduces is not an ontological distinction, that is, it makes no attempt to divide the world into 'sentences that are about things' and 'sentences that are about sentences'. Rather, it proposes a stratification of discourse, with no assumption about the type of entity contained at a given level of discourse. In the context of our present discussion, this amounts to being able, somehow, to distinguish between URIs that point to resources (level 0) and URIs that point to types of resources (level 1), where (critically) a 'type' is a description of a resource (that may or may not exist). In other words, we distinguish between pointing to the thing itself, and pointing to something *about* (ie., a description of, and therefore a characterization of a type) the thing itself.

From my (possibly naive) point of view, everything falls out of this. If we distinguish, in our discourse, between whether we are referring to a type (ie., a description) or a token (ie., a resource), then we need not make any claims about the names used to identify what we are referring to (just as, in language, there is no rule governing how we name things).

In language (English, at least), we usually employ a single quote to make the distinction. This, for example, I distinguish between saying "It appears that the Kremlin is red" (where I am talking

about the building) and (It appears that 'the Kremlin' is red" (where I am talking about the words that make up the description of the building). Notice that there is nothing syntactically distinct between 'the Kremlin' as it is used in the first case, and 'the Kremlin' as it is used in the second; the set of letters is identical. It is how the words are *used* within the sentence (once inside single quotes, once not) that makes the difference. If we can establish this syntactical nuance in the world of the web, we are away to the races.

My naive understanding of XML and RDF has already drawn that distinction. In my mind (and possibly in nobody else's, because I don't claim by any means to be an expert in the syntactical niceties of XML and RDF) I have distinguished between two types of uses of URIs, one that refers to a type (ie., to a description), and one that refers to a token (ie. to a resource). Specifically:

In a tag, any tag, if you place the URI *between* the tags, you are talking about a token:

```
<ITEM>
<URL>http://whatever</URL>
</ITEM>
```

This, thus, would denote the location of the resource itself.

But if you place the URI *within* the opening tag, you are talking about the type:

```
<ITEM about="http://whatever">
<SOMETHING>Some stuff</SOMETHING>
</ITEM>
```

This, thus, would denote the location of metadata *about* whatever is denoted by <ITEM>

Notice that no ontological distinctions are being drawn here. All I am doing is separating between the two levels of description, between types and tokens. In another context, the very same entity denoted in <ITEM about="http://whatever"> may be contained with some set of tags, and referred to directly.

In HTML it's a bit trickier, because no type/token distinction was coded into the original specs. But the same logic can be applied:

```
<A HREF="http://whatever" ABOUT="http://somethingelse">
and
<IMG SRC="http://wherever" ABOUT="http://somethingelse">
```

Now there is no rule saying that the URIs in the HREF tag and the ABOUT tag must be different; a document (say) can contain its own metadata. And all this formulation does is to allow our dereferencer to shift between levels. I can still link to my RSS file with but if I wanted, I could place metadata about that file (meta-meta-data) in a separate file

Resource Profiles

1. Introduction

1.1 Abstract

The idea of a resource profile is that it is a multi-faceted, wide ranging description of a resource. A resource profile conforms to no particular XML schema, nor is it authored by any particular author. Additionally, unlike traditional resource descriptions, which are presumed to be instantiated as a single digital file and located in a particular place, a resource profile may be distributed, in pieces, across a large number of locations. And there is no single canonical or authoritative resource profile for a given resource. This paper describes the need for resource profiles, outlines their major conceptual properties, describes different types of constituent metadata, and examines the use of resource profiles in practice.

1.2 What is a Resource?

Much of the thinking and design behind the concepts outlined in this paper are based on the idea of learning objects. This paper deliberately abstracts from the more usual mode of discourse, not in order to introduce unnecessary ambiguity, but to capture some of the ambiguity already inherent in the concept of the learning object and to place it in a light where it may be examined without a predefined conception.

The term 'learning objects' is based on the merger of two distinct concepts, neither of which are universally endorsed by practitioners in the field. The first term, 'learning', seems to imply that the item in question must have some pedagogical value. (Magee and Friesen, 2001) But either a statement of this requires that a particular theoretical approach be presupposed, in which case proponents of different theories will not be in concord, or a tacit assumption of some common definition leaves the term so vague as to allow almost anything to qualify. The second term, 'object', presupposes a specific type of software entity, derived originally from the concept of object oriented programming, in which the resulting digital asset would support the concepts of inheritance, internal variables, and internal functions. (Downes, 2001) A great number of learning objects do not satisfy any of these criteria, and the original conception is now long lost in practice.

Instead, the approach taken in this paper will to discuss 'resources' generally, and it will be stipulated that a 'resource' may be anything that may be described in a 'resource profile'. This latter term is the subject of the paper as a whole, but in brief, what may be said of a resource profile is that it is an aggregate description of a resource. A 'resource', therefore, is anything that, for whatever reason, someone has found necessary or useful to describe, where the recommended structure for such descriptions is outlined in this paper.

The discussion and debate surrounding learning objects is but one instance of many attempts to identify what may be considered to be 'basic' or fundamental classes of resources. The term 'learning objects' presupposes, in other words, that resources may be divided into categories in two ways: 'learning' and 'non-learning'; 'objects' and 'non-objects'. A slight examination of the field suggests many more ways of classifying resources: 'digital' and 'non-digital' (IEEE, 2002), 'data' and 'metadata', 'text-based' and 'multimedia', and more. No doubt each of these distinctions will be useful within a given context. But it is by no means a straightforward matter to make such

distinctions or to use them in a productive manner, much less obtain universal agreement that one, rather than the other, is a fundamental or essential categorization of resources.

For example, consider the distinction between 'data' and 'metadata', a commonly used and widely understood lexicon. How do we determine whether a given resource is a piece of data or a piece of metadata? It is said that metadata is 'data about data'. But metadata may itself be described, which is why the IEEE-LOM standard, for example, has a category titled 'meta-metadata'. Do we thence consider the metadata in the IEEE-LOM file to be data? (Bray, 2003) Obviously, there is a sense in which it is useful to think of it as data, and another sense in which it makes sense to think of it as metadata. This is a general issue. It is not possible to determine, based on the format or even the contents of a given file, whether it is a piece of data or a piece of metadata, because in a trivial sense, all data is 'about' something and can, in turn, have something that is 'about' it.

In this paper, therefore, no prior assumption is made regarding what may, or may not be, a resource, and no prior assumption is made regarding the structural, physical, or other characteristics of a resource. What makes something a resource is nothing more than the fact that somebody, at some time, considers it to be a resource. The definition of 'resources' thus offered in this paper is an ostensive definition: those things that we can and in fact do treat as resources, are what will be considered resources.

2. Describing Resources

2.1 Getting the Description Right

The purpose of this section of the paper is to state the problems to be addressed in the discussion to follow. We assume for the sake of argument that the purpose of a resource network is to enable people to be able to create, store, locate, retrieve resources. (IMS, 2003, Oliver, 2003) It is thus necessary at each stage of the process to be able in some way to distinguish one resource from another in a reliable manner; otherwise access to resources would be random. A common means of distinguishing items one from another is to give them a name, and this will be discussed below. However, while the practice of naming resources allows us avoid confusing them with each other, naming alone will not support the functions required of a resource network. If we had, say, only the names {'1','2', ..., '10025452'} to work from, we would have no means of deciding whether resource '2' would be a better candidate for a given purpose than resource '3545'.

We need to describe resources, that is, we need to be able to associate the having (or not having) of a given property to a set of resources. At first, the practice of describing resources may appear to be simple and straightforward, however, when a system of description is pressed a bit it becomes evident that it is fraught with difficulties. To take a simple, suppose that resource '23255' is what we commonly call an 'apple'. The use of the term 'apple' is itself the beginning of a description; it places the resource into a specific category based on a certain set of properties presumed to be had by the resource, that it is a 'pome', for example, that it 'contains' a 'core' and 'seeds'. The use of this vocabulary in turn presupposes not only a set of logical relations ('is a type of', 'contains') but also a specific vocabulary generally agreed upon by a linguistic community.

Compounding the difficulties in assigning descriptions to resources is the expectation that the description will be 'right', that is, that the description we apply to a resource will in some way be 'true' or 'accurate' or even 'useful'. This requirement introduces a host of new issues to the description of objects, a factor that is compounded by the use of differing metrics for the evaluation of the 'rightness' of a description. Though the philosophical literature is replete with

models and strategies, a short survey will be sufficient to make the point. On one theory, a description is 'right' if the object, in fact, has the property being described. This theory, however, leaves open the question of the description of fictional objects ('Narnia', 'unicorns') and the attribution of subjective properties ('beautiful', 'honest'). A second theory proposes that a description is 'right' if it coheres with a logical or linguistic structure of descriptions. This theory, however, leaves open the possibility of systemic error or theoretical bias ('phlogiston', 'drives'). A third approach requires that a distinction be 'useful'. This theory, however, begs the question of what counts as 'useful' (does it mean 'cash value', does it mean 'utility'?).

These larger questions will be set aside as essentially unsolvable. What this means, for all practical purposes, is that the system of description we adopt cannot presuppose any of three major sets of criteria: the vocabularies used to name either objects themselves or properties of objects; the set of logical relations between logics; and the standard of 'rightness' of a description. None of these are presupposed because there is no means to pick between one or another, and while we may each of us express preferences in our work and our day-to-day lives, it is only a remote possibility that we would ever reach consensus on any of them.

To draw out and illustrate this point, please allow me to expand on some major areas where the 'rightness' of a description poses significant problems for current approaches to learning object metadata. I would point out that these are difficulties that cannot be addressed through better practice; they are structural flaws in the current system employed to describe learning objects.

2.2 Multiple Descriptions

There is a presumption implicit in the structure of learning object metadata that there exists a one-to-one relationship between a 'learning object' and the metadata used to describe that object. Even the slightest examination of the nature of digital resources shows that this is not the case.

Technology now exists to take the same 'resource' and to output it in a variety of formats. The application software 'Cocoon', for example, uses as input resources described in XML and outputs instances of the resource in HTML, PDF, plain text, or any of a number of formats. (Levitt, 2000) Moreover, Cocoon will output, on request, either the entire content of an resource, or only partial representations of the resource. Thus, for example, we may obtain an HTML version of the full text of 'The Red Headed League' or we may obtain a PDF version of the outline of the Conan Doyle short story. Which of these constitutes 'the' resource? It should be clear that there is no correct answer to the question. In a related case, image archives often use the same digital contents to produce an 'image' and a 'thumbnail' of the image. Norman, 2003. Which of these constitutes 'the' resource?

The possibility that works may have distinct representations is already a matter that has been addressed by the publishing industry. In the FRBR standard, for example, a four-level description of published works is employed: a 'work' is realized through an 'expression', which is embodied in a 'manifestation', which is exemplified by an 'item'. (Madison, 1997, Oliver, 2003) Each of these, in turn, has a set of associated properties. A 'work', for example, will have a 'title', 'form', 'date', and more. In the FRBR, "A Work is an abstract entity; there is no single material object one can point to as the work. We recognize the work through individual realizations or expressions of the work, but the work itself exists only in the commonality of content between and among the various expressions of the work." (Oliver, 2003)

Another source for a multiplicity of description arises in the case of what may be 'subjective'

descriptions. Take, for example, the Kevin Costner film, 'The Postman', widely derided by the critical press and described as the worst film of 1991. (Ryan, 1998.) The Razzies have their opinion; I have mine, and would rank 'The Postman' as one of the better films of the year. Leaving aside the question of which assessment is 'right', we have a case here in which two distinct descriptions exist for a single film, one in which the film is classified as 'worst' and another in which it is classified 'not worst'. It is clear that there can be no single value for any given subjective description, by definition.

Much of the metadata in IEEE-LOM could be classified as subjective metadata. IEEE-LOM 5.3, 'interactivity', is a measure that, without an agreed upon metric, "can only yield subjective entries from the developers of learning systems." Schulmeister, 2001 In addition, IEEE-LOM 5.4, 'semantic density', for example, is a "subjective measure of the resource's usefulness as compared to its size or duration." (Sutton, 1999) In any case where such a subjective assessment is called for (and there are many more), we are automatically presented with the possibility of differing descriptions for any given resource. One observer may describe a learning object (or a movie) as 'too complicated for average viewers', while another may say it is 'challenging but accessible'.

2.3 The Problem of Trust

A second major problem regarding the description of resources revolves around the assumption that the person or organization providing the description will be motivated to provide an accurate description. The history of metadata is not reassuring on this point, even when it comes to what may be construed as 'objective' accounts of resource properties.

The HTML standard included the option for developers to include in document heads 'Meta' tags in order to provide content descriptions. The purpose of Meta tags in HTML documents was (and remains) exactly the same as the purpose of contemporary metadata. Meta tags were used by search engines in order to locate and organize web contents. Their use proved to be an unmitigated failure.

In "Death Of A Meta Tag," for example, Danny Sullivan summarizes, "Experience with the tag has showed it to be a spam magnet. Some web site owners would insert misleading words about their pages or use excessive repetition of words in hopes of tricking the crawlers about relevancy." (Sullivan, 2002) And Andrew Goodman offers this assessment: "Metatags, as many in the industry are aware, were an early victim, succumbing to the opportunism of web site owners. Marketers, particularly operators of porn sites, which made up much of the money-making power of Internet commerce circa 1995, made search engines like Altavista look pretty silly. Search engines which looked at and took metatags seriously were riddled with spam (insincere pages which manipulated their metatags in order to rank higher in searches) until they began more aggressively filtering spam with increasingly sophisticated ranking methods and filters." (Goodman, 2002) As Cory Doctorow comments, "When poisoning the well confers benefits to the poisoners, the meta-waters get awfully toxic in short order." (Doctorow, 2001)

In the field of metadata proper, the signs of similar information pollution are beginning to be noticed. The author of the Paintball Channel on the Internet Topic Exchange, an index of RSS feeds organized by topic, complains for example that "some suckers are using this media to air their dirty spam." (Jotajota, 2003) And while some suggest that, due to spam-blockers and harvester filters, that RSS solves the spam crisis (Naraine, 2003), it should be evident that it does not. There is no guarantee inherent in the RSS format - or any XML format - that the information placed into the file will be accurate. As Kevin A. Burton writes, "RSS is not the solution to the

spam problem. The solution to the spam problem is a distributed trust metric. The major problem here is that this would require a lot of overhaul to the existing email infrastructure." ([Burton, 2003](#))

In the field of learning object metadata there exist numerous openings for resource providers to insert false or misleading data. This will become evident once the use of metadata to distribute commercial learning content for sale becomes more widespread. A common value for 'typical age range', for example, will be '2-99' (on how many games for sale in stores have we seen this already?). Categorizations will be needlessly broad. 'Interactivity' will always be 'high', even if the resource is a static web page. Should the range of learning object expand (as I will suggest below) and more overtly evaluative metadata be included, vendors will consistently rate their material as 'best', 'cheapest' and 'most effective'. While there is no doubt that there is a great deal of honesty in the academic community, there is just enough dishonesty to undermine a system of descriptive metadata based on trust.

Untrustworthy metadata is already beginning to be seen in learning object metadata. [Friesen and Anderson \(2003\)](#) report observing metadata descriptions that are "more promotional than descriptive." IEEE-LOM and similar metadata standards have no means of addressing this. The presumption behind IEEE-LOM seems to be that reliable content authors or professional indexers would create metadata, leaving normal human error as the only major cause of disinformation in learning object metadata. If this was the presumption, it was not well considered.

3. Resource Profiles

3.1 Overview of the Concept

The idea of a resource profile is that it is a multi-faceted, wide ranging description of a resource. A resource profile conforms to no particular XML schema, nor is it authored by any particular author. Additionally, unlike traditional resource descriptions, which are presumed to be instantiated as a single digital file and located in a particular place, a resource profile may be distributed, in pieces, across a large number of locations. And there is no single canonical or authoritative resource profile for a given resource.

The term 'profile' was chosen because it allows an easy analogy to be drawn between a resource profile and the profile that might be created of a person. The traditional resource description (such as a learning object metadata record) may be seen as similar to a person's resume or curriculum vitae. Typically authored by the person it describes, it contains some essential information and selected highlights from that person's career and volunteer life. But when, say, an investigative agency is trying to come to a complete understanding of a person, a resume would be only one piece of the puzzle. A large number of additional records would be consulted, such as the person's driver's license, driving history, academic transcripts, credit record, criminal record. Friends may be interviewed, a bill payments examined, mail on and offline about the person may be read. A much more complete picture - a profile - is constructed from these various sources.

The difference between the completeness and accuracy of the information obtained in a resume as compared to a personal profile is striking. While a resume consists of a small set of information and is authored by the person, a profile consists of a large set of information authored by many people. While the trustworthiness of a resume may be cast into question, particularly if the person has something to gain from a glowing report, the trustworthiness of a profile is much higher, because data are submitted by people with no particular stake, and because different claims may

be correlated with each other and with the original resume. If we wished to consider someone for a teaching position, we would be much better guided by reference to a profile than a resume; even the most minimal scrutiny involves the checking of references, and a more thorough examination would review citations, reviews and other commentary regarding the person's work. The same reasoning applies when considering the selection of a learning resource: it is the profile, not the description, that will best meet the objectives set out above, of being able to create, store, locate, and retrieve resources.

In this section of the paper we will look at some of the defining characteristics of resource profiles. In the next section, we will survey some of the major components of resource profiles. The final section will consider questions surrounding the generation of resource profile data and its organization into a metadata network.

3.2 Vocabularies

A major underlying principle of resource profiles, drawn from the Resource Description Format (RDF) [ref], is that resource profiles may be constructed from multiple vocabularies. Any statement within a resource profile is at its core what RDF calls a 'triple' having the following form: `<subject> <predicate> <object>`. The `<subject>` is the resource being described by the profile, and is generally assumed. Thus, a profile will contain statements of the form `<subject> <predicate> <object>`. In common parlance, the attribute is a metadata 'tag' while the value is the 'value' of that tag. Thus, in a metadata statement such as `<tag> <value>`, the attribute is 'title' and the value is 'As You Like It'.

The principle of multiple vocabularies has therefore two instances. The first instance is that multiple vocabularies may be used to define the range of possible attributes (tags). This is formalized in RDF through the use of 'namespaces' or schemas. The RDF schema "specifies mechanisms that may be used to name and describe properties and the classes of resource they describe." (W3C, 2003) The second instance is that multiple vocabularies may be used to define the range of possible objects (values). This is formalized in RDF through the use of 'ontologies'. "An explicit formal specification of how to represent the objects, concepts and other entities that are assumed to exist in some area of interest and the relationships that hold among them." (Paskin, 2003) In other words, "An ontology... is constituted by a specific vocabulary used to describe a certain reality, plus a set of explicit assumptions regarding the intended meaning of the vocabulary." (Bechhofer, 2003, Introduction)

In practice, these two are typically combined. That is, the nature of the property may inherently define the set of possible values; this is part of the purpose of ontologies. For example, if we have a tag called `<colour>` then the range of possible values is clear: `{'red','orange','blue',...}`. But in many cases this is not (yet) defined, and in many cases, the relationship is not clear. Therefore, it is useful to think (at least conceptually) of the two types of vocabularies as being separate. So, suppose we had a tag such as `<colour>red</colour>`. The use of the `<colour>` tag is then specified by a schema, and the list of possible colours is obtained from a vocabulary. In general (still thinking conceptually), the format is `<schema:attribute><vocabulary:value>`. Extended, we could thus represent a statement as follows: `<appearances:colour>spectrum:red</appearances:colour>`.

By glossing over the technical details, we are able to extract from the preceding example the essential point: that a research profile is not confined to the use of only one schema or the use of only one vocabulary. This becomes clearer when we look at the profile of a person. It is clear that there are many ways to describe a person. So, too, with resources in general.

A person, for example, may have an 'appearance'. What we mean by 'appearance' is defined in a schema, and may include various properties such as 'colour', 'height', 'width', and more. But a person may also have an 'education', and which may include such properties as 'degrees', 'certificates', and 'workshops'. Not all schemas apply to all people. A driving person would have a 'driving record' while a non-driver would have none; a criminal person would have 'priors' while such a description makes no sense for the law-abiding. Similarly, a particular property may be described in a number of ways. A person's height, for example, may be described in terms of 'feet' and 'inches', or it may be defined in terms of 'centimeters'. Their 'identification number' may use the Canadian 'Social Insurance Number' or the American 'Social Security Number'.

None of these descriptions would be useful when describing a learning resource, of course; it does not even make sense to think of a learning resource as having a criminal record (only humans have criminal records, a fact that would, at some point, be recorded in an ontology). A learning resource might have a 'height' and a 'width', though, but typically only if it is an image; a text document does not have dimensional properties. While both people and learning resources may have a property called 'size', the person's size will be expressed as (say) a diameter, while an image's size will be expressed in bytes. Sometimes learning resources have more in common with people than they do with each other; a law professor and a law book may both have as a 'location' the Law Library, but a digital transcript will have as a 'location' only a URL.

It should be clear from this discussion, then, different sets of properties apply to different types of resources. Because there are many types of learning resources, it follows that learning resources ought to be described differently, with different sets of properties. An approach, therefore, such as that taken by IEEE-LOM, where every resource is described with a single set of properties, is inappropriate for this domain.

That said, IEEE-LOM already recognizes that there are different types of metadata. This may be seen by the division of the LOM into ten separate categories: general, lifecycle, technical, and like. [IEEE, 2003](#) Each of these different categories may be viewed as being defined by a separate schema. This is in fact exactly the approach taken by [Nilsson \(2003\)](#) in the RDF binding of LOM metadata. Where appropriate, he replaces IEEE-LOM schema elements with Dublin Core elements. In RSS-LOM ([Downes, 2003](#)) different schemas defined as part of the RSS 1.0 protocol ([Swartz, 2000](#)) in order to create a combined format.

IEEE-LOM also allows for various vocabularies. The classification element, for example, contains two distinct components: a reference to the taxonomy being used, and the value of the current resource within that taxonomy. As the CanCore guidelines explain, "Classification element category is sophisticated and complex, providing elements for identifying and describing the purpose of the classification, the source, taxonomic value and identifier associated with the classification." ([Friesen, 2003](#)) The use of external vocabularies in IEEE-LOM is restricted, however. In a resource profile, the use of external vocabularies is unrestricted.

3.3 Authorship

Although in a certain sense a criminal is the author of his own misfortune, the authorship of the person's criminal record is not left to the person described, for the reason that such people will be motivated to falsely report their prior convictions. In a similar manner, a person's academic transcript is authored by the university registrar, and not the person being described. The same reasoning extends to description of other types of resources. Except in certain notable cases, movie reviews are not authored by movie studios, book reviews are penned by people other than

the author. Some descriptions are not authored by a person at all. A person's power or water usage is recorded by a meter and fed directly into a central database, where it is used to issue power and water bills or to suggest targets for possible police investigations.

Learning object metadata files, however, are like many others assumed to have a single author. As we can see from the CanCore metadata guidelines, there is no provision for different authorship for different bits of information, save what (little) could be gleaned from the 'role'. (Friesen, 2003a) A learning resource profile, however, may have many authors. In principle, each statement within a learning profile could have a different author (though in practice, different authors will create different sets of tags).

The idea of attributing comments to authors is called 'reification'. Wikipedia (as of October 31, 2003) defines the concept: "In knowledge representation, reification is sometimes used to represent facts that must then be manipulated in some way, for example to compare logical assertions from different witnesses to determine their credibility. The message "John is six feet tall" is an assertion of truth that commits the sender to the fact, whereas the reified statement, "Mary reports that John is six feet tall" defers this commitment to Mary. In this way, the statements can be incompatible without creating contradictions in reasoning." Wikipedia, 2003 The concept of reification is explicitly discussed as such by Tim Berners-Lee. (Berners-Lee, 1999) And it is already instantiated in various semantic web implementations, such as Annotea. (Miller, 2003)

Tracking the authorship of metadata statements requires that author information be contained in the metadata. Author information must be contained in two places: in the first place, to designate the author of a given metadata file, which I'll call the 'metadata author'; and in the second place, to designate the author of tag contents, which I'll call the 'element author'. In IEEE-LOM, the metadata author is indicated in the metametadata. Other contributors may also be indicated in this area. Attributing element authors is not so straightforward; while Annotea describes the use of additional metadata tags, a more direct approach is preferred here: place a 'source' attribute within the tag pointing to the original metadata where the assertion was first made. Hence, for example, if we are depending on a second author for information about the resource's classification, we could describe it as follows: <schema:classification source="http://theothermetadata.com/feed.xml"> Information about the authorship of the classification metadata in this example would therefore be obtained by dereferencing the source and locating it within the metametadata.

In previous work I have referred to metadata authored in this way as 'third party metadata' [<http://education.qld.gov.au/staff/learning/courses/sdownesnov.html>], the idea being that metadata authored by the resource creator is first party metadata and that authored by the resource consumer is second party metadata. This term has been used in other work, sometimes as 'third party annotation' (Bartlett, 2001) or 'third party labeling' (Eysenback, 2001). Recker and Wiley (2001) use the term 'nonauthoritative metadata' to describe third party metadata: "metadata that describe the variety of real world cases in which a given resource has been reused, what we have termed 'nonauthoritative metadata', can be extremely helpful in facilitating the efficient and effective reuse of existing resources." The term 'third party' is preferred here as while there is no doubt of the source, there may be, as suggested above, some doubt of the trustworthiness of first party metadata.

3.4 Distributed Metadata

Alluded to in passing in the previous section, this principle of resource profiles allows that the metadata for a given resource may be stored in different locations across the internet. That is, there is no single metadata file describing any given resource; metadata about the resource may be found in numerous online locations. A metadata profile is therefore constructed by aggregating the metadata available at these different locations in order to form a particular view of the resource. It follows that there may be different metadata profiles for a given resource, as different aggregators harvest different metadata from different locations, though one could define an ideal (and usually fictional) 'total' metadata profile composed of all possible metadata from all possible sources.

Again, this corresponds with the manner in which information about a person is distributed. A person's health records are stored at a hospital, their driving record at the Department of Motor Vehicles, their academic transcripts at a university, their birth information at a bureau of statistics, and the like. Very little information about a person is actually obtained from the person himself, usually only easily verifiable data such as the person's current address and telephone number. Even though a person may assert additional information in, say, a resume, this information is in fact subject to verification through reference to the originators of that information or through the production of certificates, such as a driver's license or university diploma, and not taken at face value.

In the world of learning resources, a very similar pattern may be expected and, indeed, has begun to take shape already. For example, the learning resource titled *The Fugues of the Well-Tempered Clavier*, by Timothy A. Smith and David Korevaar, is located in one place. (Smith, 2003) This resource has been reviewed by the MERLOT Music Review Panel, and the review is located in another place. (MERLOT, 2003) An aggregator seeking to obtain a complete profile of this resource may be therefore to obtain information from two separate locations in order to form a complete picture.

3.5 Resource Identifiers

In some discussion to follow, it will be seen that a resource cannot be identified by its location on the internet. A resource may take one of several technical forms, or a resource may be mirrored to lower distribution costs. Additionally, resource metadata may have no single internet location. Because metadata descriptions of a given resource may have different authors, and may be located in different places, there needs to be a means of knowing when two metadata resources are describing the same resource. It should be clear that the title of a work cannot serve as an identifier either. For example, the title of this paper is duplicated by a description of services available to senior citizens (Senior Citizen's Guide, 2003), an account of agriculture in Kyrgyzstan (Fitzherbert, 2000), and a mainframe applications utility. (Leroy, 2002.) This difficulty is resolved by means of a resource identifier.

The same sort of difficulties exist in the realm of personal identification. Though a person may have a name, just as a resource has a title, this name may be a duplicate. There exists a Stephen Downes who is a restaurant critic in Melbourne, a Stephen Downes who works for the National Research Council, a Stephen Downes who is a visual artist in New York, a Stephen Downes who is a professor of philosophy at the University of Utah, and a Stephen Downes who was an NDP candidate in Nova Scotia. Any individual's physical address may change over time, and other identifying information, such as website address, email address, or phone number, may also

change.

Organizations respond to this difficulty by assigning each person a unique identifier. Examples of identifiers in Canada include Social Insurance Numbers, health care numbers, and driver's license numbers. Additionally, organizations, such as universities, will also assign their own unique identifiers. What is common about these identification systems is that each identifier is unique, and each identifier is stored in a canonical location (which may be called a 'registry'). In turn, these identifiers are associated with (what may be) less permanent information about a person, such as the person's name or address. When a less permanent feature of a person changes, the person is required to update the registry with the new information. Mechanisms are in place in order to prevent the fraudulent change of a registry.

In the realm of digital resources, the idea of resource identifiers has been proposed on numerous occasions. Books, for example, may be identified by their ISBN ([ISBN, 2003](#)); serials by their ISSN. ([ISSN, 2003](#)) A prominent initiative, the Digital Object Identifier system, ([DOI, 2003](#)) "provides a framework for managing intellectual content, for linking customers with content suppliers, for facilitating electronic commerce, and enabling automated copyright management for all types of media." The DOI syntax is an ANSI standard, Z39.84, ([NISO, 2000](#)) and is defined in two parts: a prefix, which identifies the identity of the registration agency, and a suffix, which is the unique code assigned by that agency. ([NISO, 2000](#)) Because the DOI registration system is a commercial enterprise, however ([OASIS, 2003](#)), organizations such as eduSource have adopted their own format, but again with the same two-part structure.

There is from time to time a call for a single standard for digital resource identification, just as there is from time to time a similar demand for a single standard for identifying people. Over time, some such standard may become a de facto universal standard (as has Canada's Social Insurance Number for Canadians), however, such calls should be resisted. Organizations may find it more convenient to employ an internal identifier scheme, employing a public scheme only when the resource is published or made public. Additionally, the use of multiple identifier systems is more able to withstand a catastrophic corruption, as even if one registry is corrupted, reference to additional registries may be employed to establish the original identity.

3.6 Models

A model is an XML description that is used for multiple purposes. The purpose of a model is to store information in one place in order to allow it to be used in multiple places. A model functions in much the same way as a Cascading Style Sheet (CSS) ([W3C, 2003a](#)) A full definition of a given style is stored in a CSS file; the CSS style is imported by the web page in which the style will be used, and HTML in the web page invokes the style by referring to it by name. In resource profiles the second step is omitted; the external resource is involved and implemented within the body of the XML.

In a certain sense, models are already supported in RDF. For any given property value, instead of using a string to indicate the value, an XML author may instead refer to an external resource. For example, the 'creator' of a document may be 'Stephen Downes'. However, this reference is vague (there may be, as suggested above, other people named 'Stephen Downes') and it is incomplete (what is the current 'email address' for the author?). RDF allows the 'creator' of the document to be identified as an external 'resource' using the following syntax: `<s:Creator rdf:resource="http://www.w3.org/staffId/85740"/>` ([W3C, 1999](#)) This is functionally equivalent to embedding vcard information into the XML (as proposed by IEEE-LOM).

In general, the use of external resources in this manner should be encouraged, and in reliable metadata networks, should be mandatory (conversely, XML which does not refer to external resources in this way should not be deemed trustworthy). The use of string data to refer to and describe external resources, such as authors and organizations, even if it is encoded in (say) vcard format, is fraught with danger. Such information will almost certainly change. Aside from the ambiguity of reference, pointed to above, people change email addresses and organizations (such as Docent and Click2Learn) merge and change names.

Because even the URLs of such resource metadata files will change over time, it is desirable when referring to an external resource to employ a permanent URL such as is provided by PURL ([PURL, 2003](#)) or a similar registry of resource locations. In such a case, the mechanism for referring to external resources would come to resemble (and, in fact, be a part of the same system as) the resource identification service described in the previous section. Hence, the reference to the external resource would be described in two parts: the name of the resource registry, and the unique identifier held by that registry. The registry, in turn, would either redirect an enquiry to the current location of the resource (as PURL does) or would return a set of metadata, which ought to include the location of that resource.

In a resource profile, a 'model' is employed in the same manner. A model has two parts: the name of the registry holding the model, and the unique identifier for the model. A model differs from an external resource, however, in that it is a partial metadata file and it does not describe any given resource. Rather, it describes a resource type, and the data contained in the model is intended to be descriptive of the current resource.

It is useful to think of resource models in much the same way we think of stereotypes as applied to people (but without the negative connotations). For example, if we have a person named 'Salty', we could add to the description of this person by invoking a specific model: 'sea captain'. Knowing that Salty is a sea captain immediately tells us many things about him: that he wears a captain's hat, that he has a peg leg, that he sings sea shanties. These details are not inferred (as would be the case with an ontology), these details are contained in the model itself. The model 'sea captain' just is the following XML: "<hat>captain's</hat><leg>peg</leg><sings>sea shanties</sings>". The model does not describe any person in particular, but when included as part of a resource profile, adds specific details to the description of the resource.

A model is used by a metadata author for several reasons. The use of metadata models may greatly simplify the creation of metadata. For example, in describing the digital rights associated with a resource, the associated ODRL file may run into several pages of detail. ([W3C, 2002](#)) However, if the relevant digital rights model is given a (recognizable) name, then this information may be very simply added to a metadata description.

A model may also be used to apply similar descriptions to multiple resources. For example, some properties of images offered by an image repository may be the same for each of 10,000 images: they may all be .gif images, 800 x 1400 pixels in dimension, with a colour depth of 16 bytes (or 256 colours). This information could be stored in a model called 'portrait', and then each of the 10,000 images could declare these technical specifications as a single line of XML code: <format model="our_models:portrait" />.

A third reason to use a model is to withhold metadata that may be subject to subsequent change, while at the same time making the current value of this metadata available to aggregators. For example, the price of a resource offered by a commercial provider may change over time. If

digital rights metadata is included in the resource metadata or content package metadata, as proposed by COLIS (Iannella, 2002), then the digital rights associated with an object cannot be changed. While this is useful (and necessary) for objects that have already been transacted, such a system is unsustainable for the delivery of rights metadata prior to the conclusion of a transaction. Once a resource is offered a \$50.00, it would have to be offered at that price forever, since no reliable means would exist for changing the price once the metadata had been harvested by third parties.

3.7 The Concept in Retrospect

The use of metadata to describe learning resources is, in essence, an effort to create a distributed and integrated system of data management and application. The concept of the resource profile, as described immediately above, represents what could be viewed as a set of best practices for such enterprises. While on the one hand the details of the concept may be subject to further amendment and elaboration by those more familiar with the details of data management and application, they are nonetheless built on known and widely applied principles, principles that may be viewed in other applications of data management, but unfortunately, not to learning object metadata.

The metaphor of a system for the organization of personal information was used throughout for illustrative purposes, but the reference standard for the elaboration of the concept of resource profiles ought to be data management theory. Several of the properties of resource profiles described immediately above are instances of data management theory. In particular, the use of resources and models conforms to sound practices of database design and object oriented programming. The former corresponds with the principle of data normalization (Gilfillan, 2000), which could, in a nutshell, be expressed as a variant of Ockham's razor (Britannica, 2003): do not multiply entities without necessity. The use of a resource identifier corresponds with the requirement for the use of a primary key for all data; the use of external resources instead of strings corresponds to the requirement of the use of (what are sometimes called) lookup tables instead of manually entered referents.

The use of metadata models enables inheritance. (Sun, 2003) Inheritance is a common (even necessary) feature of object oriented programming. Not only does the use of inheritance reduce the complexity of applications programming, it reduces the possibility of error and eases the work required to maintain application integrity. Inheritance also facilitates the identification of groups or classes or objects, and allows developers to predict the behaviour of objects even when information about that behaviour is not present. In more practical terms, the use of inheritance is an instance of 'not reinventing the wheel'. To force metadata authors, even automated metadata authors, to input, say, author data over and over again is a violation of that principle on a massive scale.

Finally, the development of a distributed system of metadata authoring is an instance of the aphorism 'two heads are better than one' and draws from the design and architecture of the world wide web itself. Centralized and sole source information networks have been found to present insurmountable bottlenecks to the aggregation and distribution of data. (Shirkey, 2003) Even closed data management systems presuppose multiple authors; an examination of university data systems such as Banner or Colleague will show that, even though the data itself is centralized, authorship is distributed. In addition single point authoring of metadata has shown itself to be unusable in a world-wide network; this method, employed in the early days of Yahoo, has been superseded by services such as Google, which employ an aggregation rather than a data entry

system.

The aggregation of information about a given resource from many sources has proven to be a formidable application. Google's Page rank system, for example, depends on what are here called third party resources. One aspect of this system is to rank a page according to the number of links to that page are contained in other pages. (Google, 2003) This provides a system of ordering search results which could not have been imagined using a system in which individual authors provide all and only the metadata describing their own pages.

The concept of the resource profile itself draws on numerous existing concepts in web design and metadata, including most clearly the Resource Description Format, but also Digital Object Identifiers and object registries, reification, FRBR, Annotea, and more. The concept described in these pages is not intended to replace any of these prior initiatives or specifications, but rather to draw on them and to convince readers to look at the concept of resource description using metadata from a different frame of reference. The most difficult part of designing metadata descriptions, including IEEE-LOM, lies in understanding exactly what it is we are trying to do, and a failure to grasp the wider picture leads to errors in specific implementations, such as the errors in IEEE-LOM that have been alluded to in passing in this paper.

4. Types of Metadata

4.1 On Types of Metadata in General

On the model suggested in the previous section, a new picture of resource metadata emerges. Instead of thinking of the metadata of a resource as a single, undifferentiated file composed of a set of standard elements, as we see for example in IEEE-LOM, it is more useful to think of the metadata for a given resource as a patchwork of metadata formats, assembled as needed to form a description most appropriate for the given resource.

Some reflection illustrates this. In some learning search services, such as the PEGGAsus project, (APEGGA, 2001) searchers are looking not only for online courses and programs, but also in-person synchronous events, such as seminars or conferences. While these are not learning objects, properly so-called, such resources should be describable in learning resource metadata. But seminars and conferences will have properties not shared by digital learning resources, a 'start time' for example. The same could be said of synchronous online conferences which, if properly designed, could qualify as learning resources.

One approach may be to simply assert that these sorts of learning resources are not described by learning object metadata. But this needlessly restricts the domain of such metadata, ensuring that no single search request could ever retrieve in the same set of results a seminar and a paper on the same topic. It is likely that as search services attempt to provide a wider range of services, they will in any case need to adapt learning object metadata. Thus viewed, such services will need a mechanism for representing all types of learning resources, not just learning objects.

In the description of types of resource metadata provided below, numerous instances of similar cases will be observed. It is hoped that the patchwork model of metadata will be well supported by example. Once the different types of metadata are enumerated, it will become evident that there are no good grounds for restricting the description of learning resource metadata to a single format.

An additional characteristic that should emerge relates to the authorship of metadata formats. Organizations, such as the IEEE-LTSC, which created IEEE-LOM, find themselves in the position of having to provide complete and wide-ranging descriptions of resource metadata. This is because they are trying to account for everything that might be needed in a single description. But one consequence of this is that they find themselves creating metadata formats in areas perhaps more suited to other authorities. An IEEE-LOM technical description for an image, for example, will look very different from the metadata format suggested by a body that specializes in image metadata.

4.2 Bibliographic Metadata

This first, and arguably core, type of metadata, Bibliographic Metadata, is related to resource authorship. It is metadata dealing with the creation, naming, publication and other intrinsic details related to the resource. In IEEE-LOM, this sort of metadata is (partially) described in the General category, and includes the identifier and catalog entries. (Friesen, 2003b) Other metadata of this type may be found in the IEEE-LOM Lifecycle category, where we find such information as version, status, contributors, and date. (Friesen, 2003c)

What should be characteristic of bibliographic metadata is that it is information intrinsic to the resource in question. That is, the fact of it being a resource implies that it would have an identifier of some sort, a title (in most cases), a creator, and a creation date. These are metadata that could only be reliably authored by the creator of the resource (or proxies of the creator, such as his or her company). Though a catalogue entry would be created externally by a registry, as described above, the creator would initiate this process and place the resulting catalogue information into the bibliographical metadata.

Numerous forms of bibliographic metadata exist. A widely accepted and standardized format is the Dublin Core. As mentioned above, Nilsson's RDF binding of IEEE-LOM replaces IEEE-LOM bibliographic metadata with Dublin Core metadata. More detailed bibliographic metadata is available for more specific types of resources. For books (including online books), the Online Information eXchange (ONIX) format may be used. (Editeur, 2003) Magazine articles, both print and online, may be described using elements from Publishing Requirements for Industry Standard Metadata (PRISM). (PRISM, 2003) Online Journal articles can be described using CrossRef, (Crossref, 2003) an application of the Digital Object Identifier standard and which includes volume, issue and page numbers as part of the standard bibliographic metadata for an article. (Crossref, 2003a) Another is the FRBR specification, mentioned above. Numerous others exist. (IFLA, 2003)

It makes no sense to attempt to stuff resources with widely varying bibliographic needs into a single, non-bibliographic format such as IEEE-LOM. A learning resource profile makes no attempt to do so. Instead, it employs the bibliographic format appropriate to the resource. While at first this may seem to introduce a degree of chaos into learning resource identification, such an approach in the longer run engenders greater standards compliance, as it ensures that learning resources are described in the same manner as other resources of the same type. Moreover, it allows for a much more fine-grained description of bibliographic information, information that can be as detailed as the creator wishes to make it, and which can be abstracted as necessary for various applications.

4.3 Technical Metadata

Technical metadata describes a specific instantiation of a learning resource, what the FRBR standard would call a 'manifestation'. (Tillett, 2002, item 13) Technical metadata is given a separate section in IEEE-LOM (Friesen, 2003d) as is appropriate. Technical metadata is constrained to describing the specific physical properties of the resource. This includes such properties as the location (online or off) of the resource, its data format, and other spatio-temporal properties.

It is important to keep in mind that a resource may have more than one instantiation. As D'Arcy Norman asks, (Norman, 2003a), "Is it best to have 3 technical elements, one for each format of a resource (a GIF, a JPG, a TIF, each with their own sizes and locations - this is my personal preference), or mashing them all into one technical element (with multiple formats, locations, etc... which one points to which?)." As mentioned above, numerous online resources can be delivered in multiple formats using applications such as Cocoon, and each of these formats will have a different technical description, which will include a different location.

Detailed technical metadata may be produced for different types of resources. Video metadata, for example, has numerous metadata requirements well beyond what may be expressed in IEEE-LOM, for example, frame information, script and transcript information, camera angles, lighting, scene sequencing, and more. (Hunter and Armstrong, 1999) Video metadata standards include Digital Imaging Group (DIG) 35, MPEG-7 and Video Development Initiative (ViDe). (VMC, 2002) The Digital Imaging Group also proposes metadata standards for still images (OASIS, 2002) as does NISO's Z39.87. (NISO, 2002) Technical metadata formats also exist for non-digital resources; for example, standards such as Friend of a Friend (FOAF) are beginning to be used to describe people, (FOAF, 2003) and events. (Miller, 2001)

It is clear that for many applications such detailed metadata will not be needed (though is the 'source' attribute, described above, it could still be located). For most applications, knowledge that a resource is of this or that mime type (such as text/html or image/jpeg) will be sufficient. (IANA, 2002) What should be noted, though, is that technical metadata should describe only the physical properties of the resource. It should not, as described in IEEE-LOM, specify specific applications or players. The difficulties of this approach can be seen in the numerous errors caused by Javascript browser detection scripts, which, by declaring that a resource requires a specific player, frequently make mistakes when newer unanticipated players are developed. Player information should be deduced from technical information, typically with reference to a centralized 'player - data type' database (much in the way a browser will associate different mime types with different plug-ins). (Netscape, 1996)

A resource profile, therefore, will contain one or more sets of technical metadata, each describing a specific instantiation of the resource. Such technical metadata ought to employ a metadata format or scheme appropriate to the physical properties of the resource instantiation being described. For reference to particular instantiations, it is useful to give each technical instantiation a name (for example, to associate different rights with different versions), though this is not essential.

4.4 Classification Metadata

The previous two types of metadata, although they may use varying schemas, have in common a single origin - typically the creator of the metadata - and are what might be properly called

'authoritative', in the sense that they are not the subject of opinion or disagreement. Such metadata also represent the only metadata that needs to be produced by the creator of the resource, and the only metadata in which the creator's assertion may be taken at face value. It should therefore be called 'first party metadata'.

The classification of learning resources, however, is another matter entirely. Though the author of a resource may offer suggestions as to the classification of a resource, typically through the 'keywords', 'coverage' and 'classification' elements, an author will seldom have the last word when it comes to classification. In the world of literature, classification is more typically undertaken by professional librarians or indexers with a close familiarity with one or another classification scheme.

Numerous classification schemes exist: "Dewey Decimal Classification (DDC); Universal Decimal Classification (UDC); Library of Congress Classification (LCC); Nederlandse Basisclassificatie (BC); Sveriges Allmänna Biblioteksförening (SAB); Iconclass; National Library of Medicine (NLM); Engineering Information (Ei); Mathematics Subject Classification (MSC) and the ACM Computing Classification System (CCS). Projects which attempt to apply classification in automated services are also described including the Nordic WAIS/WWW Project, Project GERHARD and Project Scorpion."
[<http://www.ukoln.ac.uk/metadata/desire/classification/>]

Any effort by the creator of a learning resource, or even a single indexer, to place a given resource into the appropriate place in all of these schemes would be futile. And such an effort could not even begin to organize resources into application-specific classification schemes, such as the list of 'topics' provided by Edu_RSS. (Downes, 2003a) Looking even further afield, classification schemes could (and should) organize resources not only by subject or topic, but by numerous other criteria, such as (to draw from IEEE-LOM) semantic density and interactivity.

The creation of classification schemes should be left to library organizations (who will determine global classification metrics) and professional or disciplinary bodies and organizations, who will provide more fine-grained classifications specific to a given domain or discipline. The creation of metadata describing actual classifications of resources should also be left to these agencies. In some cases, classification services will be provided by volunteer or governmental agencies, and will be available to all. In other cases, classifications will be made available as commercial services.

A resource profile for a given resource will typically contain one or more classification element. This element will describe the scheme used, the placement of the location within the scheme, and the identity of the person or authority making the classification. Classifications of learning resources would not typically be placed into the metadata provided by the creator of the learning resource, since there is no reason to believe that the classification is accurate, but would rather be harvested by an aggregator directly from the classification agency itself. For this reason, classification is the first major instance of what should be called 'third party metadata'.

4.5 Evaluative Metadata

Though it may be considered to be a type of classification, the evaluation of resources is sufficiently important in the field of learning resource metadata to merit its own consideration. This is partially because of the long tradition of peer review of learning resources, and partially because evaluative metadata is uniquely illustrative of many of the concepts described in this

paper.

It should go without saying that the creators and publishers of resources should not be left to evaluate their own work, particularly when there is a commercial incentive to a positive evaluation. Evaluation metadata is therefore canonical third party metadata. Not only could third party opinions be expressed, such opinions should be the only opinion expressed. It is unlikely that any aggregator would be interested in harvesting the vendors' own opinions about the quality of their products (unless they are an advertising flyer). Moreover, evaluations should not be associated with vendor-supplied metadata; in order to preserve its integrity, such metadata should only be available through third parties. And finally, it is reasonable to expect numerous evaluations of the same resource.

Though evaluative metadata is a new field, there is a rich history in the field of evaluation generally, rich enough to suggest that there will necessarily be numerous types of evaluation, and therefore varying schemas used to define the form of such evaluations. [Stufflebeam's \(1971\)](#) CIPP (context, input, process, product) model, for example, proposes metrics for different stages of resource production. Williams points to the need for different sorts of evaluations for different target groups: instructors, students, and instructional support people (we might also add instructional designers). ([Williams, 2000](#)) Evaluations may be the result of individual assessment, aggregated form-filling (such as at Hot or Not ([Hot or Not, 2003](#))), or the result of a collaborative process. [Nesbit, 2002](#))

Many evaluative schemes propose multiple dimensions of evaluation. For example, Nesbit, Belfer and Vargo propose a 10-part metric for learning resources, including aesthetics, design, accuracy, support for learning goals, and six others. MERLOT incorporates a three-section multi-facet metric. ([Bennett and Metros, 2001](#)) Different types of media require different types of evaluation; even this partial list is sufficient to show that a different metric is required for mammography images, including this very precise set for clinical images: "Positioning; Compression; Optical density; Sharpness; Contrast; Noise; Exam identification; Artifacts." ([Michigan, 2002](#)) And while evaluation is typically considered to be related to the quality of an object, other metrics, such as the resource's placement within Bloom's taxonomy, may also be applied. ([McGee, 2003](#))

For all that, from the point of view of users, the most popular sort of evaluation is likely to be a one-dimensional evaluation using either numerical values or a bi-value 'thumbs up - thumbs down' metric in the style of Siskel and Ebert. ([WCHS, 1998](#)) Even so, such a simple evaluation metric is far beyond the capabilities of the learning object metadata proposed in IEEE-LOM. The metadata standard does not allow any fields for evaluation, and even were evaluation to be allowed among the classification or annotation ([Friesen, 2003e](#)) metadata, it is unlikely that content producers would be inclined to include a 'thumbs down' rating among their metadata. Evaluative metadata must be third party metadata, and with that, forces the use of the learning resource profile herein described rather than the single-source model proposed in IEEE-LOM.

4.6 Educational Metadata

One section of the IEEE-LOM standard is devoted to educational metadata. ([Friesen, 2003f](#)) included within this section are fields for learning resource type, interactivity, semantic density, end user role, typical age range, difficulty, and typical learning time.

It should be clear that educational metadata qualifies as third party metadata rather than first party. For as in the case of classification, while the content author may have an opinion about the

educational use of an object, the author's opinion is unlikely to be the last word, as practitioners will over time be able to more accurately describe a resource's educational nature.

The definition, moreover, of educational metadata as third party metadata additionally allows many resources not designated as learning resources to be interpreted as such, vastly expanding the domain of potential learning resources. Many websites, academic articles, images, and the like were created for purposes other than education, and nonetheless have educational value. While the authors may have no inclination or interest (not to mention ability) to classify their work as an educational resource, such a classification could be undertaken by a third party.

It is worth mentioning that the definition of educational metadata ought to be the sole activity of groups such as IEEE-LTSC, which are well positioned to undertake such a project. As mentioned elsewhere in this paper, other types of metadata are more expertly handled by bodies and associations devoted to that type of subject material. And the definition of educational metadata even in IEEE-LOM should be more carefully defined and expanded. Criticisms in the CanCore documents of the IEEE-LOM account of interactivity and learning resource type, for example, are reflective of this. (Friesen, 2003f) By failing to clearly delineate between educational properties and (say) format properties, IEEE-LOM introduces ambiguity into the description of these elements. Does 'type' mean pedagogical type (lesson, lecture, quiz) or media format?

In practice, and as will be discussed below, it is likely that some educational metadata will not be expressed as either first party or third party metadata, but as 'second party metadata', that is, metadata defined by, and in the course of, the use of the resource. The best evidence that a resource is appropriate for a given age range, for example, is that teachers elect to use it for students of that age range. Data such as content, end user role, and typical learning type are data related explicitly to use, and therefore obtained through observations of use.

The supposition that some educational metadata may be second person metadata implies that a separate class of metadata be defined in order to define contexts of use. This, also, would be a fruitful project for IMS or IEEE-LOM. A complete description of educational context metadata is beyond the scope of this paper. However, it is important to assert that such metadata would describe not only the pedagogical content (class, subject, educational role) in which a resource is used, but also information about the user (age, education, grade level) and the technical environment. The idea here is that educational use metadata, conjoined with learning resource metadata, produce what may be called a 'use instance', collections of which may be harvested by metadata aggregators.

4.7 Sequencing and Relational Metadata

The Resource Description Framework (RDF) itself contains definitions of relational metadata, such as containers, 'see also', and 'defined by'. (W3C, 2003) Ontologies extend this capacity by defining such things as memberships in classes. Viewed formally, relations between any two entities may be defined. (SAS, 2003) This allows for the description of a wide varieties of relationships. CREAM (Creating RELational, Annotation-based Meta-data) relationship metadata, for example, can be used to describe the professor to graduate student relation. (Handschuh, 2001) Similar metadata describing relations among learning resources are both needed and necessary.

People have started to use relationship metadata to describe digital resources. One of the simplest non-ontological relationships is the reference or the citation. NEC's CiteSeer (NEC, 2003) is a

good example of the collection of this information. In HTML, citations are indicated by links, and as mentioned above, Google's Pagerank collects (but does not distribute) such data. In the world of Rich Site Syndication (RSS) the collection and distribution of relational metadata is common; Technorati ([Technorati, 2000](#)) provides metadata feeds describing a resource's 'Link Cosmos'.

Relationship metadata may be used to sequence learning resources. The IMS Learning Design and Simple Sequencing specifications, for example, are essentially a system for sequencing learning objects. ([Downes, 2003b](#), [IMS, 2002](#)) Without relationship information in learning object metadata, however, there is no means of locating learning resources for a given learning activity. ([Downes, 2003b](#)) Learning Design handles this by explicitly referring to specific learning objects, however, this method is not reusable. Significant progress could be achieved by capturing the placement of learning resources in learning designs as a type of learning object metadata; this would define a relationship between two resources placed into the same learning design, and would allow an automatic system to, when one is used, suggest the other.

More robust relations between learning resources can be described. While sequencing is, essentially, nothing more than an attempt to establish an order among learning resources, various (and as yet not proposed) relationship metadata could describe pedagogical relations, semantic relations, social relations, cultural relations, and more. Rather than taking into account mere sequencing, advanced learning design systems would have the capacity to associate, rank and suggest learning resources according to a wide variety of criteria, including those found not only in the resource metadata but also in the use instance.

Relational metadata is almost exclusively second party metadata. Though some content authors may desire to express the relationship between two learning resources, as in a series of lessons, for example, many relationships could not be imagined by their authors. Such relationships typically emerge as useful data from descriptions of use - the identification of actual links, actual references, actual placement in sequence, actual association with a certain task.

4.8 Interaction Metadata

Interaction metadata defines the types and nature of interactions that may be supported by a resource. That this sort of metadata is required is established by the observation that many resources are not static documents, but may be bits of programming, online services, or even people willing to perform a certain service or task.

There are two major types of interaction metadata, internal and external. Internal interaction metadata describes means of interacting with the resource itself. For example, a web service will support a certain set of requests. The nature of these requests and the parameters supported are defined using web services definition language (WSDL). ([W3C, 2001](#)) Or for example, a document may allow for certain types of customization by a reader, perhaps by allowing background colours to be set or logos to be inserted. Internal interaction metadata would define these.

External interaction metadata describes interactions that are supported by services related to the resource, but external to the resource. The RSS trackback system is a good example of this. In trackback, one person makes a resource available online. After a time, a second person creates a link to the resource. Trackback allows the second person to notify the first person that the link has been created; information about this new link will then be associated with the original resource. Trackback metadata associated with a resource tells the second person where to 'ping' the first

person. [Al-Muhajabah, 2003](#)

In general, an internal interaction will be used only to modify a representation of a resource, not the original resource itself (the most significant exception is the Wiki). Internal interaction is therefore essential to the customization and personalization of resources. External interaction, on the other hand, is used almost exclusively to modify the resource metadata. External interaction is therefore essential to the description of a resource.

4.9 Rights Metadata

Rights metadata is in one sense first party metadata, since no entity other than the creator may specify the usage conditions for a particular resource, and at the same time third party metadata, because as described above rights are best described via a model hosted by a third party.

A great deal of effort has been undertaken in the area of rights metadata. For learning resources the major rights metadata formats are Open Digital Rights Language (which handles metadata modeling very easily) ([Iannella, 2003](#)) and MPEG-REL ([Rightscom, 2003](#)), formerly called XrML, developed by ContentGuard. A functioning example of the use of rights metadata models is the Creative Commons system, which allows web page developers to specify use conditions by pointing to the appropriate model. ([CreativeCommons, 2003](#))

Rights metadata will be supported by a stand-alone profile management services that act as a broker for personal information on the internet. Because many such services exist, a person can choose a local and trusted broker (one they can sue if things go wrong). Because such services are working on behalf of the user (and may be paid for by the user, though no doubt free brokers will exist as a public service) there is no vested interest in ownership of the information: it is to the broker's advantage to ensure that the user owns his or her information. ([Downes, 2002](#))

4.9 Metadata Types in Retrospect

The survey of metadata types just completed should be sufficient to show that many different types of metadata are appropriate for different types of resources. Different types of metadata may also be employed to serve different user groups and to accomplish various tasks. It should also be evident that learning resource metadata should not be authored by a single entity.

The metadata types listed above were grouped into three major categories. First party metadata describes properties intrinsic to the learning resource, properties about which there should be no dispute or reason to question the author, and properties most often described by the author of the resource. Second party metadata is related to the context of use, and while not (necessarily) authored by the user of a resource, describes the circumstances in which the resource was used. Third party metadata represents the opinions of those not directly related to the creation or use of metadata, and generally expresses an opinion, such as to the classification or quality of the resource.

Only some types of metadata schemas should be defined by learning metadata standards bodies, such as IEEE-LTSC. In particular, the scope of learning object metadata schemas should be restricted to information related directly to learning itself. The definition of metadata formats for bibliographic metadata, technical metadata, classification, and rights should be left to their respective expert groups. Some sequencing and evaluative metadata schemes could also be authored by the LTSC, but these efforts should be restricted to specifically educational metadata

descriptions.

Though it may appear at first that this paper proposes a metadata chaos instead of the harmony of a single educational metadata standard, it should be observed that the use of resource profiles as described promotes greater, not less, standardization. Education is only one discipline among many. If each discipline attempts to define metadata standards beyond its pale, many needless and duplicate standards will result. Defining resources in terms appropriate to the resource moreover promotes interoperability not only within the discipline but also across disciplines.

5. Using Resource Profiles

5.1 The Lifecycle of the Learning Resource

When a child is born, it begins life with only the most minimal of metadata. It will have some bibliographic metadata: a name, some creators, and perhaps a hospital identification number. And it will have some technical information: height, weight (in ounces), a home address. Very little more, in fact, is placed in the birth notice. As the child grows and acts in the world, metadata accumulates. It acquires a track record of achievements and certifications. It begins to be discussed by other people, perhaps reviewed, perhaps recommended.

Nobody would expect the parents of a child to enter its complete life metadata into a hospital form, and so too with learning objects. When a new resource is created, it may be released to the world with only the most basic metadata: a title, catalogue number, author and owner information, a description, perhaps, and technical information. The author selects rights information by selecting a rights model from a dropdown list, and this information, and with it, the resource, is flung into the world, captured by metadata harvesters, and the new resource begins life in various "What's New" reports and daily listings.

The first round of harvesting is attended by the first round of classification, as automatic sorting systems (such as that used by Edu_RSS topics ([Downes, 2003a](#))) place the resource metadata into topical feeds. As the network develops, more advanced Bayesian categorization algorithms are used. ([Udell, 2003](#)) As the resource is noticed and read it may begin to attract some discussion. One resource rating sites (such as Edu_RSS Ratings ([Downes, 2003c](#))) readers may submit preliminary reviews in the form of a one-to-ten rating. Other people add to its record by linking to it. Readership, links and rating propel the resource higher on certain resource rankings, it is shared within and across disciplines ([Levine, 2002](#)) and it begins to be noticed by a wider audience.

Now considered a serious learning resource, easily separable by use and popularity from the masses of one-off magazine articles and hobbyist web pages, it catches the notice of an academic and is given a formal academic review. This vaults it into a new category of recognition; in short order it is certified by a professional association. This new metadata is added to its profile and vaults it into the search results obtained by instructors and designers. After being used in-class a few times, to favorable student rankings, the resource is selected for inclusion in a course package - an instructional drags it from the search results into a design template. This deployment produces a wealth of information, as the resource is now clearly associated by use with a subject, grade level, educational activity and more.

By now the resource is well established, enjoying the prime of its career. It is easily recommended by search services responding to requests for just this type of resource, is

incorporated by the less personalized but more efficient automatic learning design programs. Over time, strongly associated with a set of similar resources, it becomes a part of a cluster of items that represent the canonical learning materials for this particular field. Until, gradually, inevitably, its age begins to show. The evaluations begin to decline, and more instructors begin selecting the new, hot, version 2.0, and after a useful life, serving tens of thousands of students, the resource becomes a part of the internet archive.

5.2 Generating Resource Profiles

Since the release of the first IMS learning object metadata protocols there have been concerns and complaints about the number of fields indexers are required to complete. (Monthienvi, 2001 for example) What the lifecycle story just completed should show is that very little manual entry of metadata is required. Moreover, it should also show that the task of authoring learning resource metadata is widely distributed, undertaken by a variety of volunteer, professional and commercial agencies.

The key metadata creation is the bibliographic information authored when the resource is created. Such metadata is created as a part of the authoring process; the title, abstract and author information are gathered by the authoring software en passant and, in the way blogging software organizes personal website contents, automatically generates the initial metadata. (Gillmor, 2003) More advanced authoring software gathers the technical information describing the resource; no personal intervention should ever be required to record the fact that a document is XML, HTML or PDF, for example.

Though much effort has been dedicated toward the categorization of learning and other resources, it is likely that the bulk of such work will be handled by increasingly sophisticated filtering services. Even Edu_RSS's basis system, using Perl regular expressions (Franklin, 1994) to define categories, achieves a high degree of precision. Already deployed widely as an anti-spam system, systems using Bayesian probability metrics are being widely considered as classifiers. (Karieauskas, 2002) Finally, neural network software is widely considered to be uniquely capable of identifying categories in large clusters of resources. (Ruiz, 2003)

Potentially the most useful metadata will be created through use. It is arguable that the best determination of the proper classification and description of the resource is obtained via contextual information. (Downes, 2003d) From a practical standpoint, this implies the employment of context-aware learning resource viewers and management systems. When a resource is selected for use in a given context, this use is captured and the information placed in an accessible metadata file. The appropriate classification of the resource may then be determined as a function of the aggregated contextually-generated metadata.

5.3 The Metadata Distribution Network

Some words are necessary regarding the organization of a system for harvesting and using resource profile metadata, as it is not evident at first glance how a system deploying multiple metadata formats, multiple servers and multiple authors may be structured, much less how such a system may actually promote, rather than hinder, interoperability.

It is perhaps most common to think of such a network as completely connected, that is, everybody accesses everything. Such a system, as a searcher's experience with Google may suggest, can be overwhelming. Moreover, it is nearly impossible to achieve precision when everything is

interconnected; setting 'Google Alert' ([Google, 2003a](#)) to return new references to 'RSS', for example, results in my receiving mostly items about Indian politics, and not the material on Rich Site Summary required. Thus, in addition to thinking of the network of resource profiles as a distribution system, it is also necessary to think of it as a filtering system. The obtaining of finely grained search results is a consequence of decisions made by aggregators and harvesters at various points in the system.

As mentioned above, resources are initially entered into the system using first party metadata. This metadata is created as the file is authored and is made available on the resource owner's web server or resource repository. It is then harvested by a harvester, and at this point the first filtering decision is made: not every aggregator harvests every resource metadata. Out of the thirty thousand or so RSS feeds available, for example, Edu_RSS harvests about 200. This makes Edu_RSS a highly selective filter, even before the first resource is even seen, of metadata content.

As metadata is received from the 200 repositories, it is evaluated by Edu_RSS. It arrives in a variety of formats (five different version of RSS, various RSS modules, Atom, and Dublin Core). Each of these feeds is translated using XSLT into an internal format unique to Edu_RSS. Not all information contained in the original feed is stored, only that which is relevant to Edu_RSS (which allows a source metadata file to specify 18 technical parameters, and for Edu_RSS to store, simply, 'image/gif'). Edu_RSS also adds to the metadata en passant; its major addition is to categorize the resource, as described above, but it also adds date, author and source information as appropriate. Edu_RSS may optionally reject metadata records that, say, fall outside its categorization criteria. This is the second layer of filtering.

What is important to note is that Edu_RSS does not act alone as an aggregator. It operates alongside dozens, maybe hundreds, or aggregators, each dedicated to a specific niche. While some aggregators, such as Technorati, NewsIsFree, Daypop and more, aggregate from the entire list of weblogs, others are dedicated to specific topics or specific types of data (such as images or videos). Though the majority of RSS readers today read individual channels, because of the volume of material it is likely that people will begin to read selected feeds provided by aggregators (already, services such as DayPop's 'Top 40' are among the most popular). As resources are release they are reviewed. Any of hundreds of reviewers may take part in this process, and each reviewer may select certain types of resources and employ their own research criteria. These reviews, also made available as metadata, are harvested in exactly the same manner as first party metadata and are, using XSLT again, joined to the original metadata record. At this point, the collected metadata for a particular resource begins to resemble a research profile. Crucially (unlike peer reviewing as practiced by academic journals), these reviews are not themselves a filtering mechanism, however, they may optionally be used as input for the next layer of filtering.

Edu_RSS and other aggregators offer output feeds or harvested and organized metadata. These output feeds include not only first party metadata but also categorization information and aggregated review information. Metadata for the same resource may vary from aggregator to aggregator, depending on the categorization and evaluation mechanisms employed. Typically, an aggregator will offer numerous feeds, dedicated to specific subject areas, specific authors, specific dates, search results, and so on.

By specifying a query to the aggregator, the third layer of filtering is deployed. This third layer applies user preferences against the already filtered metadata offered by the aggregator. Most often a user will request metadata on a certain subject or as a certain search result. But the user

may at this point include numerous additional criteria, on either a case-by-case or default basis. For example, they may require that resources displayed have achieved a certain evaluation value, have obtained a certain certification, be associated with certain digital rights, be authored in a certain language, or, for that matter, satisfy a given range for any of the metadata values supported by the aggregator.

Aggregators such as Edu_RSS retrieve the requisite metadata, and in one final transformation process, convert it using XSLT into the format requested by the searcher. Hence, for example, Edu_RSS outputs metadata in the five RSS formats and Atom, as well as in plain text, HTML, Javascript, or (planned) email or web services. At least one of these formats will be compliant with virtually any application the searcher is using (and typically, the searcher would not even concern himself about the reply format). This is end-to-end standards compliance: no matter what format the resource provider uses to express resource metadata, the user is able to use it transparently in his or her own application. The hard work is performed by the intermediary services that harvest, transform, and deliver the search results.

5.4 Projected Metadata

It should be clear that many resources will have very little associated metadata, especially when they are first deployed. How is it possible to determine the classification or the value of an object, for example, when it has never been used?

The analysis of existing metadata permits the extrapolation of unknown metadata from existing metadata. For example, knowing that the author of a certain piece is 'David Wiley' it would be reasonable to infer that the resource will be about learning objects or a related topic. It is, by contrast, unlikely to be a treatise on advanced biochemistry. In a similar manner, estimations of the likely quality of an object may be inferred from existing metadata. A learning resource authored by 'Joe Schmoe' may be predicted to be of low quality based on existing evaluations of Schmoe's earlier work.

The simplest form of predictive metadata is based on averages. In a given metadata collection, all objects with a certain metadata value (author='Joe Schmoe', for example) are considered. The evaluation values for these objects are added and then divided by the number of objects. This produces an average; the average is then projected to be the evaluation value for a new, as yet unevaluated, object. More sophisticated forms of prediction include combinations of factors (author='Joe Schmoe' and topic='biochemistry') and conditional probabilities.

Since the projection of metadata is essentially an associative activity, more complex relations between input values and predicted values may be derived using neural nets. In such a case, unanticipated relations may be found and be employed to form background hypothesis. These background hypotheses are then weighted in combination with specific predictions. For example, while David Wiley may be predicted to write good resources about metadata, we have no way of knowing how well he would write about object sequencing. But if we know that people who write well about metadata also write well about sequencing, then we can apply this generalization to the more specific case.

It is worth noting that projected metadata is not of much use without the expanded metadata set available with resource profiles. Though projections could be made within the confines of IEEE-LOM, such projections will not be of a great deal of use. The more subjective the metadata property, the more useful projected metadata will become, because it is subjective metadata that

is the most difficult to collect and the most useful in application.

Because projected metadata is formed by hypothesis, it is important that users be aware of this status (hence, reification is doubly important), and it is important to build corrective measures. Obviously, one review does not over-rule a projection based on a substantial body of evidence, but as the number of actual values is increased, the importance of the projected metadata should decrease. If the projected metadata is appropriately formed, then the actual evaluations should trend toward the projected values; if they do not, this information should be used to correct the projection algorithm.

5.5 Data Network Properties

From above, we recall that the purpose of a metadata system is to enable users to create, store, locate, and retrieve resources. The concept of resource profiles has a bearing on each of these processes. This bearing is perhaps best illustrated by sketching two major types of resource distribution network. It will be argued here that the adoption of resource profiles favours the use of a harvesting (or distributed) network, rather than a federated system.

The distinction is at times an elusive one. Stephen Lanahas argues, for example, that the internet is actually a federated system, and not a distributed system as is usually presupposed. "The word 'distributed' implies that one system will be spread out to different locations. Federated supports the sense that we're dealing with a host of systems, (which in truth are not really components if they can stand alone). These systems form a "cooperative" community which can be morphed into many manifestations simply by inclusion or exclusion of end-user configuration / access to them." ([Lanahas, 2002](#))

From the point of view of applications, Lanahas is without doubt correct. Very few applications are distributed (although grid computing poses an interesting counterexample). Services, such as web servers, are stand alone, and a user will use these services sequentially, access being granted on a case by case basis. "What we see in any viable global architecture is the need to segregate application functionality and provide efficient data flows between them," argues Lanahas. This runs contrary to current trends in e-learning. He observes, "most people in the information technology arena have been focused on delivering tight integrations for the past decade or more." Thus, for example, a login accepted in one system is carried (through Shibboleth, say) to another system.

From another point of view, however, the internet may be viewed as a massively distributed system. Data is not stored in one place, but is spread across the internet. Information about a given person, for example, may be found on dozens of different websites or data servers. This, too, is contrary to current trends in learning technology. What has emerged, especially in the area of metadata repositories, is what I have characterized as a 'silo' model of information management. ([Downes, 2003e](#)) Tight interoperability between applications is necessary because applications must interact with each other in order to use combinations of data.

Hence, for example, until very recently a metadata repository such as MERLOT refused to share its metadata (and even today, only shares a small subset of it). Learning Content Management Systems do not share data at all, depending instead on an internal database system, or 'library', of learning content. The contents of these libraries must be specially designed to interoperate with each other; hence the advent of detailed specifications such as SCORM.

The dangers of tightly integrated applications depending on narrowly defined data should be evident (and if not, can be drawn by analogy from Microsoft's approach to the desktop environment, which operates according to a similar paradigm). First, such a system is increasingly vulnerable to malfunction or attack. Because systems are tightly coupled, a flaw in one becomes a flaw in all. Hence, in Windows, a buffer overflow error in MSN Messenger can be used to compromise user login or data access routines. In a common login system, such as Shibboleth, an unauthorized login in to one system exposes all connected systems to attack.

Second, interoperability becomes increasingly difficult. The need at all for events such as 'PlugFests' should illustrate the danger here. It becomes almost impossible for new players to enter such a network, as the technical overhead becomes impossible to manage. Innovation becomes increasingly difficult as interoperability constrains what may be done. Such a system tends, as we see again with the Microsoft analogy, to favour a single, monolithic system. Vendor lock-in becomes common, and consequently prices increase as the cost of migration increases.

Third, a tight coupling between applications limits the range of data that any given application can manage, and any data in the system must be usable by all applications in the system. This results in the creation of unnecessarily complex data formats (the current specification for a SCORM compliant learning object serves as an example), with a significant danger of this data format becoming proprietary and inaccessible. That one cannot read MS Word documents without a Microsoft-compliant product is an example of this danger; that one cannot read a PDF document with Acrobat Reader is an example. Products that unscramble these formats (such as are now available in Linux) become increasingly difficult to develop, and as of the DMCA are illegal.

(As a parenthetical remark: recent developments in the RSS community, involving the use of pinging and trackbacks [ref], pose just this sort of danger, and should be avoided. Though they offer a promise of greater efficiency, they needlessly restrict the scope of the network, pose barriers against new application development, and introduce new vulnerabilities, as the recent 'Lolita' spam demonstrated. (Trott, 2003))

The use of a loose, variable format such as is described in this paper, argues against tightly integrated applications. Any given application, because it is stand-alone, can read and create as much, or as little, metadata as it required. An application may be a part of the network without instantiating all properties of the network. For example, the proposed DRI specification suggests that any and all repository support the 'search' function, an essential requirement in a federated system. This compels any repository to support a considerable overhead. But if data flows freely, search can be handled by specialized applications (such as aggregators), relieving smaller repositories of this burden.

Much of the potential described in this paper is simply not possible in a federated system. Distributed evaluation metadata and contextual metadata are captured in many places. It is not clear how a searcher could rank learning object search results according to such criteria, since they will not be present in the metadata made available by the learning resource provider (one might suggest that such metadata be reported to the originator, but it immediately becomes suspect, as the owners of a resource are very unlikely to accept and pass on metadata reporting that its resource should not be used).

5.6 Interoperability

Many of the arguments for a single metadata standard or for a tightly integrated application network are based on a premise of increased interoperability. By allowing many metadata standards, and by decoupling applications, it is argued, we will return to the days where data produced on one computer could not be used on another computer.

It is indisputable that agreement on standards is necessary to promote interoperability. However, it is open to argument as to just what these standards should describe. Throughout this paper, a set of standards applicable to all applications and all data formats has been assumed: minimally, XML, and for wider functionality, RDF. These standards may be described as low-level standards; they are not specific to any type of data or any particular domain or discipline. What is key is that they are, insofar as possible, semantically neutral.

The standards being defended, though, are much higher level. They propose domain-specific metadata, application program interfaces, common object definitions, common taxonomies. They are not semantically neutral; indeed, they are often explicitly defined to propose a semantics, to allow people not only to use the same words when they communicate but to mean the same thing by those words.

No doubt there is utility in commonality of meaning; otherwise aircraft advertised as headed for London would find themselves landing in Tokyo. But agreement on meaning is not something that can be, or should be, stipulated in standards. This becomes particularly evident when the domain of discourse becomes less objective and more subjective. In such cases, a commonality of vocabulary denotes an agreement, a voluntary compact entered into in order to indicate an affiliation and common purpose. They are not proscribed, they are subscribed.

Interoperability need not be world-wide and universal; it may function according to community. Just as there is no need for biochemists to describe the pedagogical properties of a research article, so also two differencing schools of thought may disagree on the classification of such a document. In times of great change, as Kuhn observes, such vocabularies may even become incommensurable.

Crucially, then, at a certain level, interoperability is not - and cannot be - a property of the resource. With respect to the meanings of words, interoperability is a property of the reader (after all, a word such as 'cat' does not inherently contain its own denotation; it must be interpreted, and against a conceptual background, a denotation derived). In a similar manner, with respect to the meaning of metadata (and other properties) of a resource, interoperability is and must be a property of the reader application.

Consider what the web would have looked like were we to require that all web pages be 'interoperable'. At the time of the deployment of the web, we would have had to create MS Word and Word Perfect versions, there being a word processor standards war on at the time. Many important features of the web, such as hyperlinks and plug-ins, would have been impossible. Web pages, instead of averaging only a few bytes, would have been much larger, making the web itself almost unusable. But worst of all, the resulting network would not have been any more interoperable than the one that did, in fact, develop.

The success of an interoperable network is based on neutrality at the centre and robustness at the edges. We did not build one road network for Toyotas and another for Fords. We did not create

one telephone network for business calls and another for personal use. The same hold true for learning resources. The more rigidly we define learning resources, and the more rigidly we define the tools that transport them, the less interoperable such a network becomes. Already we need special tools to convert Word documents or SCORM compliant learning objects [ref], an application which otherwise performs no useful function.

6. Concluding Remarks

6.1 The Future of Metadata

The science of metadata has been traditionally depicted as ordering the unordered, that "the purpose of metadata is to impose some order in a disordered information universe." (Lagoze, 2003) For the most part, however, this objective is misplaced. This is not because the desire to order the universe is misplaced; indeed, without the order inherent in natural laws and classifications the universe could not be comprehended at all. Rather, it is because the task of ordering information is best understood as something that is not accomplished in the creation of information, but rather, in the use of information. And the use of information is something that, like its object, almost defies order.

The central thread running through the concepts and mechanisms described in this paper is the recognition that the ordering of the universe, if it is to be accomplished at all, will not be accomplished in one place, in one way, or by one person. It is a recognition that a resource, like the proverbial elephant, may be viewed from different perspectives by different people. This is especially the case in more practical environments: a person buying an elephant, or seeking to use an elephant to pull a cart, will be interested only in a narrow set of properties, properties that might even be satisfied by certain oxen or horses better than some other elephants.

The second major thread running through this paper is the idea that, in order to be useful, these myriad descriptions must be communicated and connected one to the other. The idea is that, although there is no single common system of description, neither are there millions of individual descriptions. One person's description of a resource may have a great deal in common with another's, and these descriptions could usefully be clustered. groups of people with a similar perspective on a resource will adopt a similar vocabulary. Hence the need for a two-way flow of description, to enable people with such common interests to draw from and support each other.

This essay is a description of the technical and conceptual infrastructure underlying a system of metadata that adheres to these two threads. As mentioned above, it attempts to employ existing protocols and processes rather than redefine the concept of resource profiles from scratch. That this is possible without major modifications to any of the existing protocols and processes described shows that, to a significant degree, the properties essential to the creation of a resource profiles network have already begun to be embedded in the metadata network. However, until the nature of resource profiles is widely understood and widely shared by practitioners, these initiatives will continue to operate in silos, in isolation from each other, and the longer term benefits of metadata will not be realized.

6.2 The Intelligent Network

One might ask, what are the longer term benefits of metadata? Where is the payoff? Near the beginning of this paper, it was suggested that the purpose of metadata was to enable people to be able to create, store, locate and retrieve resources. In this final section we will look at how a

network as described above realizes these objectives.

A great deal has been written about applications and systems that will use metadata in order to accomplish, say, the task of searching for resources online. Some authors, for example, propose that intelligent agents will work with metadata in order to organize and filter online information. "Resource discovery by agents can enable qualitatively more flexible applications than those in existence today, due to the fact that systems can be built to intelligently react to situations and environment not known at the time of system design." (Lassila, 1997)

The use of intelligent agents, however, simply places on computer software the onus to perform tasks that humans have thus far not been able to do. There is no reason to suppose that agents will be more successful, because agents will face the same problems humans do. There are too many resources to search, too many possible interactions, uncertainties in vocabulary, and trust issues. If the organization of information remains unchanged, agents will have no more success than humans. But conversely, if the organization is modified, then humans themselves may be able to perform the tasks previously assigned to agents.

To understand how this is possible, it is necessary to shift one's point of view from the idea that the network of information needs to be organized to the idea that what we want is a self-organizing network of information. That is not to say that no human intervention is required: people will, of course, have to create resources, describe resources, and use resources. But it is to say that the impossible task of organizing, sorting, filtering and retrieving these resources will be performed not by agents working on the network, but by the network itself.

We are already familiar with self-organizing networks. The human brain is one such system: constituted of billions of interconnected neural cells responding to and comprehending myriad sensory input, the human brain, with no particular design or program (and certainly no homunculi) manages to arrange all that data into an understanding of the world. (Loder, 1996) The study of the functioning of the human brain has led to the development of neural networks as a theory of computation. Today, connectionist systems are widely understood and studied, and though they have evolved far beyond their original biological basis, the fundamental principles remain constant.

The first principle of neural network design is that it is a form of distributed processing. No one node, no one neuron, corresponds to a macro phenomenon such as 'understanding' or 'our idea of the city of Paris'. Each neuron, by itself, with only a partial understanding of the process, manages only one aspect of the total function or concept. And the second major principle is connectivity. Neurons send information to each other, not at random, but as input to layers of additional neurons. Thus, for example, in the human visual processing system we observe layers of interconnected neurons performing the task of resolving random visual data into what Marr called the "2 1/2 dimensional sketch". (Glennester, 2002)

The network of resource metadata described in this paper enulates the neural network. Layers of raw, disorganized input are provided by resource creators. This information flows, via aggregation, to a secondary layer, which performs a preliminary sort and filtering. Metadata may flow through additional layers as necessary. Finally, it reaches the output layer, where the resources are used. Data from the use and through what neural network theorists would call 'back propagation' this usage metadata is used to fine tune the connections and processing in the resource network. The result is that no individual or organization 'organizes' the network; it organizes itself.

How do we know this will work? We know, because it does work: it works in human cognition, and it works in artificially developed neural networks. Moreover, we have seen evidence of it working already on the web, through such phenomena as PageRank and blogging networks. The self-organizing network is not merely a pipe-dream, it is here already, and to see it those working in the field need only perform that hardest of all tasks, to recognize it.

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My Canada

In the days of the nation-wrenching referenda on the separation of Quebec half a generation ago, many federalists adopted the slogan, "My Canada includes Quebec."

As a slogan, it wasn't particularly effective. But it captured two essential features of the new Canada we are just beginning to see: the idea of ownership, in the sense that what this nation is becoming belongs to us, is even a part of us; and the idea of inclusion, a recognition that while the Quebecois may dress funny, speak funny, and are, even, a nation unto themselves, their loss would *diminish* what we have been building together.

Happily, the majority of Quebecois agreed, and so this nation remains a part of the larger political entity, and so we as a whole were able to continue in this noble project of redefining ourselves as a country.

What we are seeing today is the beginning of the fruits of our labour. We set out to build a nation based not on a particular language or culture or even a particular geography, but as a set of background assumptions and institutions. Our national character is defined not by some fundamental founding document and predefined identity but rather by the institutions and measures we take in order to ensure well-being and harmony among our people.

To Canadians, especially young Canadians, as a recent [Globe and Mail series](#) observed, this new sense of identity is almost second nature. "They are the most deeply tolerant generation of adults produced in a nation known for tolerance," [writes](#) the *Globe*. "They live, as one young woman observed, what their parents had to learn."

Some commentators, such as a recent [Washington Post article](#) on our new-found identity, attribute our good fortune to luck. "America invented itself," writes the author. "Canada sort of happened."

But there is more than that, much more. If you look at the sort of things we have been able to accomplish over the last twenty years or so, it becomes evident that the Canada of today is the result of the dedication, sweat and sacrifice of millions of individuals.

Consider...

We provide the essentials of life, including health care, to every person in the country. When polled, Canadians routinely report universal health care as our crowning achievement, definitive of national identity. But it is more than that: social welfare is available in every province, unemployment insurance is available to every worker, and the Canada Pension Plan (or Quebec Pension Plan) ensures that our old can live in dignity.

Canadians are safe and secure in their own cities and towns. Think about it: it is possible for me to walk, without fear, through the streets of Canada's largest city, a population of 4 million, in safety. Canada has accomplished this through firm but gentle policing (one t-shirt available at the border bears the slogan, "Canada: Land of Polite Police"), strict gun laws that keep their presence to a minimum despite a constant inflow from south of the border, the abolition of the death penalty, and more.

Canada's legal system benefits from a fair and tolerant legal regime. Much has been made of our recent flirtation with the legalization of marijuana and our outright legalization of gay marriage. But these are the end results of a system of legislation and enforcement which, in recognition of prevailing (though still minority) trends in the country, has come gradually to reflect our diversity.

Even twenty years ago, the simple possession of marijuana was not strictly enforced and warranted only small fines. Being gay or lesbian has been legal for as long as I can remember. Gay pride parades are an occasion for celebration, and often include the mayor and other politicians. The Marijuana Party - which advocates the legalization of marijuana - is a legal (though fringe) political party and its B.C. leader, Marc Emery, smoked pot on the front steps of the Toronto police station last week.

But we have gone beyond mere social security and safety. We have, as numerous commentators have reported, embraced the idea that we are a multicultural country. This is something that goes well beyond mere tolerance: it is something that we encourage and celebrate. Alberta, for example, has a reputation of being right-wing and intolerant. But in the capital, Edmonton, the annual [Heritage Festival](#) attracts more than 6,000 volunteers, 50 cultural pavilions, and 350,000 visitors - in a city of 900,000.

I could go on - I could talk about Canada's Charter of Rights and Freedoms, I could talk about Canada's contribution to the world in the form of peace-keeping, human rights overservers, mine sweepers, doctors and health care workers, and more. I could talk about our advances in science and technology - we were the third country to launch a satellite, we have the world's highest free-standing structure, we have the world's fastest (by far) internet. I could talk about how Canadians have contributed to the world of culture and literature.

Or I could talk about myself. I could talk about how, as a child, I was taught that Canada resembles a "salad bowl," in which each ingredient maintains its distinctiveness and yet contributes to the whole. I could talk about growing up in an environments where my parents and teachers asked me to please not fight with the French and with the Catholics (diversity was something different then). I could talk about being poor, living on Canada's welfare system, and slowly, determinedly, taking a tentative foothold on each rung this caring society offered me to make something more of myself. I could talk about being a long-hair all my life, being a radical, being, at times, very angry, and yet still obtaining employment, still sitting on committees and boards, still being respected on the basis of my opinions and my contributions to society.

We, as a nation, have evolved slowly. In contrast to the American dictum of "life, liberty and the pursuit of happiness," we have (informally, in a typically Canadian way) adopted the slogan, "peace, order and good government." Such an objective is not built with sweeping reforms and grand principles, it is built, a piece at a time, on a framework of institutions and associations. But if I had to identify the keys that make such a society possible, I would narrow down to two major things: the elimination of need, and the empowerment of the individual.

In his important work, *The Struggle for Democracy*, [Patrick Watson](#) clearly delineated the relationship between wealth and governance. It is not possible to exercise one's rights or civil liberties while at the same time in a state of poverty and need. The more one's sustenance is dependent on conformity with to some established order, the less one is likley to be able to take into one's own hands the means to challenge that order. Democracy requires a certain level of prosperity in each of its citizens.

There has been much discussion in my field about the means to best provide an education to the disadvantaged people of the nation and of the world. How astonishing that the single, most basic, most effective means is so often overlooked: feed them. Learning, progress, empowerment - none of these are possible in a system where one's basic well being is under seige.

The second major principle is the empowerment of the individual. This includes - but of course is not restricted to - their enfranchisement. It was a long struggle in Canada to grant all adults the vote, and it is an even longer struggle to grant to them access to those institutions that would allow them to make a difference. The *Globe and Mail* notes that young Canadians are abandoning the ballot in droves: but it notes (though only in passing) that they are instead taking the management of their community and country directly into their own hands.

The empowerment of the individual is not accomplished externally. It is not something that can be *given* to you: you have to obtain it for yourself. In the last twenty years, we have seen this principle demonstrated on a global scale: the people of the Philippines, of Korea, of Eastern Europe, of Argentina and Brazil, have shown us that liberation comes from within. The sad experiences of Haiti, Somalia, and more recently, Afghanistan and Iraq, show that it cannot be purchased from without.

In the individual and communitarian sense, the empowerment of the individual means giving that individual the space (and the means - see the first principle) to find, and express, their own identity, to realize their own potential. What we have seen in this nation is that people find their identity in a myriad of ways, some, by preserving and promoting their culture, others, by the free expression of thought and emotion in literature, art or song, others, through an affinity with a higher power, with their ancestors, or with the natural world, and still others by souping up, jacking and racing a Camero.

This is our Canada, a project still not complete - so far from complete - but a magnificent achievement that is a testament, a living legacy, to the dreams and aspirations of so many who have gone before.

This - after all - was *not* an accident. It was planned, a very deliberate, not fully formed but idealistic vision of what life in a paradise *could* be like if we would only begin to live the dream toward which we aspired. It is the nation that took former Prime Minister's Pierre Trudeau's [comment](#), "The state has no place in the bedrooms of the nation," quite seriously, quite literally, and which saw the next generation of sexual orientation activists work - and *live* - in a manner befitting that ideal.

It is a nation in which, in the mid-1980s, I came to be employed by the Arusha Centre, a development education centre, in Calgary. Over two years with Arusha and the Development Education Coordinating Council of Alberta (the layers of committees and organizations is typical - governance being as important as outcome), I was exposed to the Hedleys, who had worked as teachers for two years in Brazil, to activists returning from construction tours in Nicaragua, to Philippine immigrants trying to organize a community beauty pageant, to the Chilean exile community, to Salvadoran guitarists, and most of all, to hundreds of ordinary bread-and-butter Canadians working with these communities, trying to understand their needs, and helping them to join Canadian society or return home, whichever they preferred.

It is a nation in which [the national student press](#), CUP, did 20 years ago (and still does) promote itself as an agent of social change. The debate was never about whether our society should be

improved, nor even about whether it should be a more diverse, more caring, and more supportive society, but rather, of how this was to be achieved and what role the press - student and mainstream - should play in that effort. Former CUPpies have scattered through society, the years of effort expended in such discussions being reaped a generation later in a harvest of enlightened leadership.

Over the years, as I have lived and worked in five provinces of this great country, and have travelled through the other five (and a territory), I have met not hundreds but thousands upon thousands of people, working in their own niche, serving on volunteer committees, staffing booths and telephone lines, donating their money, working for NGOs instead of corporations, working as a fifth column *within* corporations, sacrificing, sweating, but most of all *living* heart and mind in the Canada we now see ascendant.

And it is working. Our [young people](#) "are pursuing democracy in the workplace and in marriage. They are a global generation, committed to issues of tolerance and social justice. They are a generation led in so many ways by its women. They are, of course, the best-educated generation the country has ever produced, possibly the best-educated generation of young adults in the world. Look at them on the streets. Love is bubbling across racial and ethnic lines, and the Canadian post-ethnic identity is on its way to reality.

"And always keep this in mind about them, because it is the generation's most significant characteristic: They are not a sudden sociological phenomenon; they are a generation whose values have evolved from those of the generations preceding them."

If you look on the streets, in the schools, in the community centres and beyond, in the forests, in [Katimivik](#), you will see this younger generation building something even greater. A few days ago, for example, I read of two young students at Mount Allison University who, as their summer employment, obtained a grant and some funding and established a community garden in the town of Sackville. Their garden, explained the students, wasn't *just* about organic gardening - though it was partially about that. It was about community involvement and organization.

In the dressing room of the Montreal Canadiens, a hockey franchise storied with glory and tradition, a [placard](#) on the dressing room wall reads, "Nos bras lassés vous tendent le flambeau. A vous, toujours, de le porter bien haut." And as is the custom, the translation: "To you with failing hands we throw the torch. Be yours to hold it high." It is, of course, a line from the poem, [In Flanders Fields](#), by John McCrae. It is a poem, and an idea, that resonates with Canadians, signifying not only the sacrifice Canadians have made, but the [reasons why](#) they made it.

Last week, I had the [privilege of listening](#) to former general Romeo Dallaire describe the horror faced by and witnessed by Canadian peacekeepers as the slaughter of 800,000 people broke out and as the intervening forces withnessed, and were shot at, by child soldiers using today's lightweight automatic rifles. Do you shoot children? Or do you allow them to, one by one, kill the civilians you are trying to protect? "The sergent remembers clearly - digitally clearly - the moment he gave the order," recalled Dallaire. "The soldier remembers clearly - digitally clearly - pulling on the trigger, the cartridge flying up in an arc, the child's head exploding..."

I want you to understand this. I want you to understand not only the glorious side of Canada's new revolution, a quiet revolution that began on the battlefields of Europe, carried forward in the church basements of Saskatchewan and the student press of Quebec. I want you to understand that there have been casualties, civilian and military. I want you to understand that people -

people like Dallaire, and many hundreds of thousands more - have dedicated their lives and paid the price for this, our new National Dream.

Sometimes the price is, as it has been for so many soldiers, one's life. Sometimes it is, as it was for Canadian doctor [Norman Bethune](#), a lifetime in a foreign land. Sometimes it is, as was the case for Pierre Trudeau and so many others, the unrelenting call of civil service. And sometimes, as in the case of Dallaire and his troops, the price is paid in the knowing and the remembering.

I remember, in 1988, running for a couple of kilometers alongside the Olympic Torch as it passed through Edmonton on its way toward the Calgary games. As we made our way into Hawrelek Park, I was able to reach up, and place my fingertips along the side. I remember it being a light tan brown and a rough, carved surface. And I felt, from the torch into my self, the sense of belonging, of achievement, of idealism, pass.

My experience of the Canadian dream is much like that. I am close enough to touch it and into my life it breathes. I wrote, in an interview last year (and in my Personnel review at work), the following, which I have now posted on [my web page](#):

"I want and visualize and aspire toward a system of society and learning where each person is able to rise to his or her fullest potential without social or financial encumbrance, where they may express themselves fully and without reservation through art, writing, athletics, invention, or even through their avocations or lifestyle. Where they are able to form networks of meaningful and rewarding relationships with their peers, with people who share the same interests or hobbies, the same political or religious affiliations - or different interests or affiliations, as the case may be. This to me is a society where knowledge and learning are public goods, freely created and shared, not hoarded or withheld in order to extract wealth or influence. This is what I aspire toward, this is what I work toward."

Jeff Kerr once remarked, back in the halcyon days when I worked at [Assiniboine Community College](#), pushing for online learning for their students and especially for those at Kerr's Brandon Adult Learning Center, that "You take such risks!" In the sheltered clime of organizational culture, perhaps. But when looked at alongside those of my compatriots, the risks I took - and still take - are nothing.

And yet still you might ask, you might wonder, why? Why *this*? And partly it's the deep sense of urgency prompted by the European wars, by the African wars, by the cries of the people in Ethiopia and East Timor. And partially it's the example set by people like Pearson and Trudeau, Bethune and Banting (and so many more). But behind that, behind all of that, *this*:

I think back to the days when I still taught philosophy, when a student asked the inevitable question, "What is the meaning of life." And I thought about it for a while, and I thought about the time, a couple days earlier, I was walking through the streets of Strathcona, and I heard the children laughing in the nearby schoolground, the wind lightly rustling through the trees, the blue skies and the white clouds, and the perfect sense of harmony I felt at that moment.

And I think about the perfect days. Sliding through glassy moonlit waters over Lake Christie at [Camp Opemikon](#), listening to the laughter of the loon through a spotless, starry night. Or sitting by the shores of Lake Superior on a sultry August afternoon, watching the storm clouds roll through the sunset on the horizon. Or just sharing my front porch with my cat, watching the neighbourhood go by, the sound of happy conversation wafting from Mountain Road, the robins

foraging in my front lawn, the maple swaying gently overhead.

[In diversity, harmony.](#)

This, *this* is my Canada. My home. My love. My life. My dream.

