# Formative research on a model for introducing meta data schema in a training organization

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**Abstract**

Meta tagging learning objects to allow search and retrieval is being promoted by several organizations, most significantly, the U.S. Department of Defense through the Advance Distributed Learning Network (ADLNet). Most work has focused on technical impediments including interoperability among Learning Management Systems (LMS) and development of standards. This work is a first effort on providing guidance for instructional designers within an organization.

A model for developing a unique meta tagging schema was developed and tested using an extension of the formative research methodology. Based on feedback, changes and new directions are discussed.

## 1. Introduction

Much attention has been paid to the possibilities arising from using the world wide web (web) as a delivery mechanism for instruction. As with most new technologies (at least since the advent of film and, we suspect, dating from the advent of such new technologies as writing), some hail the web as the savior of education while others question its efficacy or fear it's insidious side effects. The usual result of most new technologies after the dust has settled is that for the most part, much the same information, using much the same pedagogy is delivered with a flashy new cover, with some gains and some losses for some students. The web may suffer the same fate. Certainly, many courses online are little more than online page turners. However, some attention is now being paid to a new use of the web – learning objects.

Learning objects are pieces of instruction – an animation, a picture, a text block, an evaluation item. If learning objects built and stored in retrievable libraries, an instructional designer could use these objects when constructing a course. Indeed, a learner (either an independently or within a company) could search for knowledge and view what they wished – learning just what they want, when they want it.

Models of delivery of this type already exist. Clip art and animation libraries exist online. Course developers or other users can peruse and download media. Within the educational milieu, textbooks, videos and print packets are often used.

As learning object libraries become more common, instructional designers and course developers may be able to find an object for nearly any instructional concept that is ubiquitous enough to

justify the expense of creating an object. These objects, built by custom development houses, may well convey the information better, faster and cheaper than a self produced artifact. Course developers and instructional designers will become cobblers of information brought together from multiple sources. They will create only small parts of instruction. They will become experts in learning and learning resources. While traditional instructional design will never disappear, this new role for instructional designers may become a significant new direction in learning and training.

The concept of learning objects allow this metaphor to be effectively brought forward in web based instruction. Many challenges exist before this technique can be harnessed. Some are technical – how can different systems acquire, open and track objects? Groups such as the IMS project of Educause and the DoD's Advance Distributed Learning group (ADL) have been working on these issues.

However, instructional designers have very different needs. Before the use of learning objects becomes accepted practice, several needs must be met. A partial list includes:

- Clear and simple explanations of underlying concepts.
- Specific and clear models and methods for application of techniques – how to apply the ideas of learning objects in a specific organization.
- Examples of learning object systems – which allow entry and retrieval of learning objects.
- Specific guidance in using a new paradigm of instructional design which necessitates thinking in smaller "bits", instead of larger course size "blobs".

Instructional designers are usually working on very tight deadlines. They have not the time to understand new, deep concepts that do not offer clear guidance – what needs to be done, how to do it and the benefits. Without detailed support from the development community, this powerful new approach may well remain an interesting curiosity to be studied by a few academics.

This paper is a study of a model which attempts to take a first step on the journey of providing guidance, explanation and specific approaches to application of learning objects in an organization.

## 2. Statement of Problem

Developing a model for implementation of a new paradigm offers great challenges. First steps are fraught with difficulty and peril. It is essential to present the new ideas in a way that intrigues, yet does not confuse. A case must be made that time invested in learning about new applications is time well spent. Once that case is made, a clear path to early success must be charted. Guidance along that path must be provided. This must be delivered with clarity, but not condescension. An additional challenge with this particular task is the complexity of the concepts and the paucity of existing information, much less models.

There are many areas begging study concerning learning objects. This promises to be a powerful new direction in instructional design and delivery. We are present at the birth of a new industry. To date, most of the concern of those interested in learning objects has been on the technical questions of how to make knowledge objects seamlessly import and play within compliant Learning Management Systems (LMS). However, there has been little work to provide explanation and guidance for instructional designers wishing to utilize knowledge objects. With so great a need and so little work done, the temptation is great to paint with a broad brush. Nevertheless, one suspects that what is needed is not so much broad explanations as detailed guidance, even if that necessitates limiting this work to a much smaller portion of the overall topic. As we shall see in this model, defining the universe is an essential first step.

Therefore, let us define our universe. The purpose of this paper is to propose and test a model for constructing a unique meta tagging schema for learning objects within the bounds of an organization. It is specifically a model designed to provide a first entry into using learning objects within an organization. There is some question (detailed in the results section) as to whether or not organizations should be creating their own schemas. In the conclusion section, an argument will be put forward that this creation is an essential task, not only for the terminal result, but as a means to building an understanding of the powers, structures and future growth and application of learning objects within an organization.

The reason for setting limits is to make this paper a digestible first venture. The areas not considered have not been ignored because they are less important. An entry point had to be chosen. Other considerations have been excluded only from this particular paper. They will be

considered in subsequent work. There are many papers, many studies and many models required to attain even a basic understanding of this new technology. This is only a first step.

There are implicit assumptions within this study. While some remain hidden from the author, explicating all known assumptions will add to the utility of the model. These assumptions include:

- The intended audience are instructional designers in mid to large sized firms that have a team of instructional designers, some technical infrastructure and have time and money to investigate using learning objects.
- There is an underlying assumption that the first application of learning objects will be in teaching skills. It seems too early in the day to enter the consideration of whether or how they may be used for soft skills or even general knowledge acquisition.
- Finally, two different approaches to using learning objects are implicit within this model. In one, instructional designers use learning objects to create training. This is assumed to be the most common application. Those writing about instructional design and learning objects argue for this approach (Wiley, 2000) where instructional designers "cobble together" learning objects with original material to meet instructional goals. However, a second approach will also be considered, one which holds considerable appeal. This is the use of learning objects for self directed learning in a type of performance support. This approach necessitates an even larger mental shift – away not only from large chunks of training to small bits, but also away from a training paradigm, where the designer creates and guides the learning to a user centered, user directed, just in time support paradigm.

## 3. Background Literature

The process undertaken during this study was front loaded. Before the model could be created, a great deal of synthesis was necessary. Before meta tags could be useful, there had to be a clear explanation of what they were and how they could be used ***from an instructional designer's point of view.*** Unfortunately, there was a dearth of information on this topic.

Meta data is not a new concept. It is a fundamental concept in data bases. Meta tags are not very new, they have been part of web developers' knowledge for several years. There is a growing body of thought and some literature in library science surrounding using meta data and meta tags for classification growing out of digital library initiatives. There is now a growing number of people writing about instructional uses of meta tags. However, at the beginning of this process, there was very little and the little that existed was in disparate fields. The adventure of this paper is the process of synthesis of knowledge from data base, programmers, learning management systems, military systems, instructional developers, standards organizations, web developers and library classification experts.

Instead of a more traditional literature review, the author will use this section to trace the education of an instructional meta tagger. Most of the information is not published. The information was gleaned from conferences, conversations, classes and on line.

The first exposure came at an industry conference where Harvi Singh introduced the concept of learning objects and the promise of tying together objects into instructional pieces. (Singh 1999) Another presentation at the same conference demonstrated a software package under development by Oracle which also utilized these ideas. (The Oracle project was disbanded a short time later.)

From these sessions, the author had two resources: The first was the IMS web site (www.imsproject.org) where people were collaborating on creating a meta tagging standard. The first meta data specification was released during this time. (IMS) This weighty tome was over a hundred pages with some explanation that could be understood, more explanation that was far too technical for someone without programming experience and many pages of undecipherable schema.

There was also a meta data primer on this site which, while very technical, did provide a first glimpse of what meta tags in instruction might be. (Wason, 1999)

The second resource was Harvi Singh himself and the web site of his company (at that time Empower, now MindLever.com). White papers on the site provided important information. (no longer available) Several meetings at conferences (ASTD in June of 99, Online Learning in 1999

and Training 2000) as well as on going email and phone conversations built an cursory understanding of the potential inherent in meta tags.

Throughout 1999 and the beginning of 2000, the author tried to further his understanding through these conversations and rereading IMS documents. The progress was slow. In summer, 2000 there were huge leaps forward. A class on meta tagging was offered in the School of Library and Information Science by Dr. Elin Jacob. An hour long conversation with her in May, 2000 opened a new vista of understanding. Prior to that conversation, the author did not know that meta tagging was a more universal subject of study than a few programmers tied to the IMS and a few web developers using meta tags to increase traffic to their web sites. During that conversation, Dr. Jacob clarified that meta data was really a method of classification, "and that's what we do here." (Jacob, 2000).

Armed with a suggested reading list, the author began to explore the literature of classification. Particularly significant was Milstead and Feldman's article which drew clear parallels between cataloging and meta data. (Milstead and Feldman, 1999).

Near the same time, Steven Downes posted an article to the corped newsgroup. (Downes, 2000) While this article had some flaws, it presented a powerful metaphor. Instructional objects created by experts are already in use in education. Textbooks, film strips, videos and the like are all learning objects. The difference now is that learning objects live on the web and, with meta tagging, searches can be more simple and more accurate.

The class with Dr. Jacob completed the process of constructing a foundation of understanding. The combination of the Downes metaphor, viewing meta data as a classification system, seeing background information from a number of sources and the lectures and direction of Dr. Jacob proved successful. As the course moved quickly from basic ideas (Gilliland-Swetland) of meta data through understanding of other tagging schemas including the Dublin Core (Hilman), understanding solidified. It was particularly important to try to tag a series of objects using the Dublin Core. Two important findings came from this exercise. In the first place, a universal standard is by necessity so limited as to have very limited utility. In the second, even within a small group of people tagging, working with a similar perception, there are often serious and fundamental disagreements on vocabulary. The need for controlled vocabulary and extensive work to build a shared vision is essential to successful implementation.

The final important task undertaken in the class was the creation of a unique schema based on the w3 RDF specifications. (W3). During this project, an understanding of the powers and limitations of different standards became clear. Returning to the IMS specifications, the author finally understood the pages of standards. This process was essential in the evolution of understanding. This experience of creation of understanding through guided projects is the reason why the model for using meta tags focuses on the organization building a unique schema. While the IMS standard will almost certainly form the backbone of all schemas, it is only by going through the process of creating understanding by developing a schema that an organization will be able to effectively apply meta tags to learning objects. This shared vision and shared understanding are essential.

During the course of writing this paper, the advanced distributed learning network (ADLnet.org) funded by the Department of Defense released it's shareable course object resource model (SCORM). This group and the SCORM is important in promoting understanding and spreading the word of learning objects. Perhaps most important, the DoD has begun to invest heavily in learning objects. There is an overall plan to provide computers and educational opportunities for all people in the military. DoD views meta tags as an essential part of this effort. ADLNet, in partnership with the IMS, is positioning itself to be central to creation and dispersal of information on meta data.

**4. Methods (Participants, setting, instruments)**

In seeking a methodology to guide this study, the author turned to Reigeluth and Frick's formative research (Reigeluth and Frick) for guidance. While formative research has been successfully used to improve existent theories and models, it has not, to our knowledge been used to test a new model. In this study, because both model and field of study are so new, the need was structured scrutiny and feedback rather than studies of instantiations of a theory or model. Basic questions such as, 'Does it work? Is it technically? Is it useful? Is it applicable?' were the essential questions at this stage of research. Formative research methodology provided a framework within which to consider these issues.

The answers to these questions are not clearly apparent. The information brought together in the explanation of meta tagging has never been brought together before. The explanations for

instructional designers have never been made before. This was ground breaking work and involved compiling bits from numerous sources and synthesizing and translating from a variety of disciplines (mostly database, computing and library and information science). This basic research and development was essential in construction of a model. However, as this was such a new undertaking, it was imperative that formative research be done on the work accomplished so far. Without knowing more about the potential efficacy of the model, the data gathered by putting the model into practice would be of questionable use. Chances for a successful implementation were small, but tracing the causes of failure would be very difficult. Instead the author chose to expand the application of this methodology to more basic research questions. The formative research process as presented by Reigeluth and Frick (Ibid) would be more suited to the next stage of research. However, this measured consideration of the model by reviewers from different backgrounds is, we believe a valid extension of the formative research methodology.

As detailed above in the literature review section, a broad sweep over a substantial time was necessary to collect enough disparate pieces to cobble together an explanation of meta tags and tagging schemas from an instructional designer's point of view. It became clear over the course of the eighteen months of pursuing an understanding that for a model to be successful, a detailed explanation of tagging schemas with examples and guides to how and why they could be used would be essential. So, any model had to be preceded by an explanatory piece, with both parts presented as a whole.

While going through the process of understanding meta data in general and meta tagging schemas for instruction specifically, the idea was born that the best way to really understand the importance, utility and workings of meta tagging was for the designers in an organization to create a unique schema. This was to be the model – entry into using meta tagging by creation of a unique schema. The model was constructed, putting forth a nine step process for the development of a unique schema.

With a two part paper (explanation and model) completed in July of 2000, the testing of the model was ready to proceed. (Attachment A) The research plan was to seek people from three demographics, ask them to read the paper and respond to a series of questions either by email or in person. The explanation for participants is appended in Attachment B. We sought at least two

people in each of the following fields: instructional designers in practice, meta tagging specialists, instructional design theoreticians.

The questions were purposely designed to be open ended. The number was limited, to encourage more response. The final list of questions (Nine total, with and A and B sub question on one question) is appended in Attachment C. The questions were very basic – Is the explanation correct? Does the model make sense? Could you use it? Would you use it? What is clear? What is confusing?

The goal was to provide a basis and guide for conversation. This goal was successful. While no respondents specifically returned a completed questionnaire, all respondents answered in the spirit of the questions.

The paper and questions were posted to a newsgroup. The paper, with a link to the questions was posted on the front page of the IMS Project web site. The paper was distributed to several colleagues throughout the country. Finally, the author attended an ADL "Plug Fest" at the University of Wisconsin, Madison where the SCORM guidelines were being explained and discussed. Several copies of the paper were distributed and the author was asked to present his views on the implications of meta tagging for instructional designers at a panel discussion. Overall, the coverage was excellent.

Beyond shallow responses (i.e. Interesting. I liked it.), thoughtful responses were received from ten people. The quantity was sufficient, (although any researcher would wish for more) and the quality of response was also of useful detail. The least information came from practicing instructional designers. One gave rather detailed information. Two others gave cursory responses. However, the author was a contract instructional designer for an online learning organization for two months during the writing of this report. This experience added greatly to an understanding of the needs and motivating forces of designers in the field. This knowledge is brought to bear throughout the writing of this final report.

Notes of live conversations and print outs of email feedback was reviewed. Significant considerations brought up are discussion in the next section. Suggested changes to the model and the explanation are presented in the conclusions. The next steps to undertake are presented in the implications section.

Overall, this blending of qualitative research interviews and an extension of formative research methods has proven to been useful by the three measures Reigeluth and Frick expound (Reigeluth and Frick) effectiveness, efficiency, and appeal.

## 5. Results – Data

Only one of the respondents dealt directly with the model nor answered the questions around whether or not it would work within an organization. While initially surprising, upon reflection, this is reflects the make up of the respondent pool. These people had, for the most part, already thought about knowledge objects. They were considering how this explanation worked with their understanding. They were considering it from the point of view of an expert as opposed to a practitioner. The practitioners who read the model assumed it was correct. The one respondent who specifically addressed the model was very positive both in its conception and the possibilities of that it held within his organization. The lack of response is telling in itself. While one cannot assume the model will work without testing, the fact that no one raised objection to the method proposed in the model ascertains that it is at least solid enough to take to the next level – actually testing the model following the classic formative research methodology.

The reactions fell roughly into three areas: 1) Definitions 2) Technical considerations 3) Instructional theory. A discussion of each area follows.

### 5.1 Definitions

Two concerns arose in this area. The first was with the term knowledge bits. The author originally used the term knowledge bit to imply small pieces of information which could be put together to teach or support performance. As the idea of performance support was important, the term knowledge bit evoked the milieu of knowledge management – capturing and presenting bits of knowledge.

#### 5.1.1 Terms

Some respondents had difficulty with the term bit. Those who come from a computer background have a very specific idea of what a bit is – the smallest piece of information. So, conversations about the size of bits seemed fundamentally wrong.

Other respondents had a problem with the term knowledge. Thinking of small bits or pieces of knowledge seems just as fundamentally wrong to a constructivist practitioner. How can knowledge be an object? How can it be labeled and transferred? It can't. While there was the realization that these objects were not knowledge, but were information which could be used to create knowledge, there was a very strong dis-ease with the concept, so much so that some were unable to get beyond the term to the considerations of the uses of meta tagging and the implications of the model. Obviously, the term had to be changed. Most work in the field has used the term learning object. That term has been adopted here as well.

### 5.1.2 Size

The second area of discussion in this area was a definition of learning objects. Specifically, how big is a learning object? How small can it be? The IEEE Learning Technology Standards Committee (LTSC) defines learning objects as "any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning."(LTSC) This is, it seems, an obvious product of a committee. It is so broad as to be nearly useless. The worrisome question is, however, where to trim? One respondent offered the excellent suggestion of defining not so much by describing the object, but by describing the limits of the object. Specifically, he suggested defining the smallest possible learning object as any object to which there could be attached a learning objective. Is there a top size? What about the question of digital or not? Web based or not? More study and much more thought is required.

## 5.2 Technical Considerations

Perhaps the greatest finding was that the description of objects located in the first part of the paper was basically correct. There were a couple of oversights and the questionable areas described below, but beyond that, the explanation passed muster. This is a very important result. The description is certainly more instructional-centric than any other description the author has found. The description alone will be of great help to designers. There were, however, two

considerations which were raised by technical experts. Both are unclear not only in this paper and model, but also in the meta tagging community as a whole.

### 5.2.1 Version Control

The first consideration is version control. One of the powers of the web is that information can be updated on a regular basis. Corrections can be made. Changes can be shown. The problem with versions when they are being referenced from libraries to instruction the world over may best be illustrated with an example. If a learning object had a table that showed how a tire behaved under different weights and there was an error in how the table was constructed. What should be done? The first impulse would be to fix the error. However, what if in a training, that chart was used as an example of mistakes that can be made?

There is no clear answer. However, the standards organizations (IMS and SCORM) are advocating not changing, but tracking versions of objects. There is no clear answer within an organization. It depends on how fast and often materials change. Within the boundaries of an organization this may be decided either way. However, the advocacy for "universal interoperability" is probably correct in supporting keeping objects the same and bringing out a new version with changes. This does not address what to do with every changing objects – such as data feeds with constantly fluctuating information, such as prices of stocks, weather patterns or the like.

### 5.2.2 Placement of tags

The second technical consideration is where the meta tags "live". Responses have shown that there are two models, with different people advocating each. In one model, a learning object must live on a web page. This has been used in geo-spatial information for years. It is the way most digital libraries seem to be classifying objects – using XML to create a document description of tags. The idea is that even small objects can be embedded on a single page and the meta tags will be placed in the html document heading. Those advocating this approach point out that the object and it's description are then together, so it is easy to automatically seek and retrieve the object through a web interface. The difficulty is that meta tagging schemas can easily grow to be extensive lists of several hundred tags. While adding these lists can be automated,

looking at the html of the objects can be a challenge. The entire process, as it gets more complex, invites human error.

The other position is using a data base model, where the object and it's descriptions may be stored separately. The two are linked through a reference number. The searches are actually of the meta data. Once a decision to use a learning object, then it is accessed. In this model, rather than trading objects, organizations are trading descriptions. Only when a decision is made is the actual object brought into play. This does mean that once an object is brought in house, the tagging must be added to the organization's data base. This position is the one being promoted by most at the IMS and SCORM.

It is not clear at this point which of these two positions is more useful for instructional designers. It is not clear how workable either solution is. As neither are much beyond theoretical, models, thought and study are called for.

### 5.3 Instructional Queries

The two areas which raised the most objections were in this area. Both illustrated direct conflicts with positions taken in the model and explanation. One calls into question the task set forth in the model. The other questions the view of using learning objects to support user directed learning.

#### 5.3.1 Model Conflict

This question was raised by those most closely associated with developing the IMS meta tag specifications. The question can be phrased, "The focus should be on using existing schemas to foster interoperability. Why would you suggest people write their own schemas?" There is certainly an amount of ownership tension evidenced in these comments. Many of these people have spent many years understanding and devising the IMS (and the IEEE's LOM). The purpose of these standards (by definition) is to encourage universal use. These respondents see the suggestion that organizations make their own unique schemas as a dangerous direction. In addition, one respondent pointed out that developing schemas is a difficult task to do well. His fear is that the model might foster many flawed schemas which would not support interoperability. As interoperability has been the main focus of the work of the IMS and ADLNet, this is a very serious worry.

### 5.3.2 What is Instruction

The second concern raised relates not so much to the concept of exchanging learning objects as to the unique application raised in this model of learner directed search, retrieval and use of learning objects. This idea cuts at the heart of what instructional designers do. How much of learning should be designer directed? How much should or even can be user directed? Two instructional design teachers questioned the efficacy of learner driven instruction. There are many times that learners don't know what they need, they point out. One noted that with every new technology, a large amount of effort has gone into preparing instruction for that new technology. That time could be better spent on developing new pedagogy.

One instructional designer was very excited by the concepts in the paper and felt they were very useful. It will be interesting to see how this tension plays out in the field over the next several years. It is, one can imagine, a fundamental tension concerning the core principles of what designers are doing, can do and should do.

## 6. Conclusion

Based on the data, a number of changes will be instituted in the model. Some feedback will be ignored at this time, but will be watched for future input. For clarity, each area of concern will be addressed in order.

### 6.1 Definitions

While the author personally likes the term knowledge bits and the images is can evoke, the concerns raised were significant. It cannot be a good idea to try to change entrenched notions of labels without very good reason. In addition, learning objects is becoming a near universal term. Therefore, throughout this paper, an attempt has been made to use the term learning object instead of knowledge bits.

The question of size and a further question of a definition of learning objects is an interesting one. It certainly deserves further study. It is beyond the purview of this paper and this model. The author suspects that a definition may be unique to organizations, rather than a universal

truth. The author further suspects that a definition including size limits will evolve in a symbiotic interaction of research, thoughtful reflection and practice.

### 6.2 Technical Considerations

The considerations of version control and not updating bits seems to be a valid suggestion. There is a tension between building objects for sharing and building objects for use internally. While the motivation of international standards boards is clearly to encourage the creation of interoperable objects, this desire may not necessarily also speak to the needs of an organization.

After consideration, the author proposes introducing the concept of a gateway. The model supports the creation of unique schema which are supersets of international standards, yet also wants to support the free exchange of learning objects between organizations. A gateway may allow both of these outcomes. Objects coming in from outside the organization must have the additional unique tags added. Objects available for trade outside the organization will have the unique tags stripped. Within the gateway, the organization may choose whether or not to update objects or maintain version, with a tag that tells the version and a default field in all searches that seeks the latest version unless otherwise indicated. Objects intended for outside the gateway will be versioned.

It should be noted that this question indicates a difference in outlook. The model really focuses on use within an organization. The standards bodies focus on use **between and among** organizations.

The second issue – where to place the tags, will be a continuing issue. The author suspects that the answer lies in trying both ways and assessing the efficacy of both. There are people working with both models. The author has heard from a group which is building tools for European companies which wrap the tags in the header of html documents. There are also reports from respondents of data base driven experiments. The author is currently beginning work on a database driven system. The decision to use a data base system was based on more powerful search functionality and the ease with which a tagging system with controlled vocabulary could be instituted.

### 6.3 Instructional Queries

The questions raised in this area are the most telling. The first calls in question the model itself. The second questions one of the applications for learning objects. These arguments will almost certainly grow more heated as learning objects become more widespread. This is not surprising, nor, necessarily, a bad thing. Learning objects and the application of them to support performance over training cuts to the core of long held beliefs of instruction and the job of instructional designers. It would be better to have vehement objections than universal complacency. These ideas **will fundamentally alter the world of instructional design**. If that doesn't get a few people upset, something is wrong.

The concern about organizations creating unique schema stems from the different perspective of the creators of standards. These organizations are largely composed of representatives of higher education and vendors of learning management systems, with some representative of flight simulators thrown in for good measure. The resulting standards were necessarily compromises. The people involved in the IMS and SCORM are, for the most part, forward thinking, caring individuals. While some give the impression of merely being interested in getting as simple a standard as possible in place so that they can stamp their product with a "Standard Compliant" label, most truly want to promote the use of learning objects. However, they take the international view… the view of those who make and trade learning objects – hopefully seamlessly. The view of this paper is of the instructional designer within an organization who may or may not bring objects in and may or may not trade objects. The work of the body is essential to allow importation of objects. The interoperability flowing out is not nearly so important.

As stated earlier, there is no question that the IMS specifications should and will form the core of any schema tagging learning objects. However, there also seems little question that those specifications cannot, by definition, be detailed enough to serve all the people all the time. Adding unique tags is an essential task to getting good search returns.

In addition, while creating the unique schema is important for the resulting schema, the task itself is even more important. The author spent over 18 months tying together pieces to understand schemas. The act that made it all come together was creating a unique schema. By going through that process, an organization will come to understand what tags are, what they can do, what tags are good and bad, what tags they may want. They can understand the relation

between their needs and the standards. They can see the wisdom of the standard schemas. There may be another way to get this understanding, but the author has sincere doubts.

The concern that bad schemas may abound which will dilute the efficacy of learning objects certainly has validity. However, returning to the concept of a gateway, objects that are traded should have their unique schema stripped. Standards are for trading. Unique schemas certainly will have little or no meaning to other organizations without extensive explanation. It seems doubtful that organizations would wish to openly share this information with others. This value added information is certainly part of the knowledge base of an organization. One may also hope that by going through the process of creating a schema, the schemas may not be so weak. The way people become experts at building schemas is by considering and building. While time consuming and challenging, the author believes that spending time gaining this expertise will be time well spent for the successful application of learning objects.

The questions of instruction vs. performance and designer vs. user selection are interesting and will certainly continue. This is not the venue in which to provide an answer, if indeed an answer can be provided. However, it must be noted that the model and learning objects are not dependent on the uses to which the objects are put. The author suspects that the application of performance over instruction would be most appropriate in a situation where highly motivated, well educated learners are sharing knowledge that is changing too fast to be explicated in a training. Additional applications would include tasks and look up functions that are either so numerous or so constantly in flux as to make their memorization unwise. However, like the poor, there will always be the trainees. They shall never perish from the face of the earth. Unlike the zealots who discover a new learning technology and blissfully proclaim the end of all things past and the dawn of a new world, the author believes that learning objects will utterly change **a segment of the training and learning field** and within that small section of the world of training, designers will view a new paradigm of instruction – small pieces cobbled together from numerous sources. However, like the paperless office and the cashless society, the dream of a training world made up solely of learning objects is one best left in academic conversations over coffee rather than as a goal toward which to steer.

However, if the specter of learning objects and performance portals make instructional designers nervous…make them defend their positions (hopefully after considering their positions)… this is all to the good. Honest reflection cannot but make any practitioner better.

## 7. Implications

Much has been done. Much remains. With this important ground work laid, the time is right for a great deal of work. The information received has resulted in several changes which strengthen the model. The research allows us to proceed with confidence that the basic model is correct. The next work will proceed in four areas.

### 7.1 Network

There is a small group of people interested in learning objects. There is a danger that people will jump into tagging without thinking. The result will be near useless tags, wasted resources and abandoning of this powerful technology. The only way to prevent this is to share the knowledge and models gained as widely as possible. This paper has served to set in motion some connections through the panel discussion at SCORM and the paper posted on the IMS site. Continuing this work is essential to continued success. Sharing research findings will serve to both promote and further both study and results.

### 7.2 Definition/Size

Consideration and models regarding the size of knowledge objects is an important step. Review of the works in digital libraries, object oriented programming and instructional designers, particularly those interested in chunking learning may provide guidance. Different definitions of size must be tested in organizations, for it is in the field that the efficacy of the definition will be found. The three dimensions of effectiveness, efficiency and appeal suggested by Frick & Reigeluth (1999) can provide good goalposts as to which definitions work.

### 7.3 Test the Model

The explanation and model must be tested. Now that this pre-formative research is complete, the next obvious step is to move into a more traditional formative research project. Use the model with an organization. Interview at the beginning, during and at the end. Review the results. Compare them to expectations. Look at the understanding at the beginning and at the end of the process. See if there is an understanding of learning objects. Review the schema constructed for

correctness and efficacy. Then guide the behavior over an extended period of time and see if the organization begins to utilize learning objects. Is there success with the objects? Why or why not? Adjust the model based on results.

### 7.4 Build a tag and search system

It would be beneficial to build a concrete example of a learning objects system. The author is designing and will build a data base system that allows the entry of learning objects with extensive tagging by both IMS and a unique schema. Searches will be established so that instructional designers wishing to construct a training, or individual learners searching through a performance support portal will be able to search objects, select from the items returned and view the selected items. Through a contact with the Army, a large amount of extent objects will be input into the system. This model system will provide an excellent explanation and will also begin to demonstrate the real powers of the learning objects paradigm.

### References


Downes, S. (2000) Learning objects. [On-line]. Available: http://www.atl.valberta.ca/downes/naweb/Learning_Objects.htm

Gilliland-Swetland, A. J. (2000). Setting the stage. In M. Baca (Ed.), Introduction to metadata pathways to digital information. California: Getty Information Institute also available at http://www.getty.edu/gri/standard/intrometadata/

Hilman, D. (2000). Using Dublin core. http://purl.org/DC/documents/wd/usageguide-20000716.htm

IMS Consortium (August, 1999). IMS learning resource meta-data information model. On IMS global learning consortium website. www.imsproject.org/metadata/mdinfov1p1.html

Jacob, E. (2000) Personal conversation.

Milstead, J & Feldman, S. (January, 1999). Metadata: Cataloging by any other name…Online Magazine. www.onlineinc.com/onlinemag/OL1999/milstead1.html

Reigeluth, C. M. & Frick, T. W. (1999). Formative research: A methodology for creating and improving design theories. In C. M. Reigeluth (Ed.), *Instructional design theories and models: A new paradigm of instructional theory.* (pp. 5-29). Hillsdale, NJ: Lawrence Erlbaum Associates.

Singh, H. (1999). Learning objects in instruction. Conference session at Training '99. Chicago.

W3 (2000). Resource description framework (RDF). http://www.w3.org/RDF/

Wason, T. (1999). Dr. Tom's meta-data guide. On IMS global learning consortium website. www.imsproject.org/drtommeta.html

Wiley, D.A. (2000). Learning object design and sequencing theory. Unpublished doctoral dissertation, Brigham Young University. Available: http://davedwiley.com/papers/dissertation/dissertaion.pdf