Developing a knowledge capture system based on sharable and self documenting learning objects

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Discussion Schedule:
Discussion: 19 - 28 May 2003
Summing-up: 29 - 30 May 2003

Pre-Discussion Paper

Abstract

Today's organizations have well developed systems for capturing financial data and producing reliable and accurate information. An area that is often overlooked is the importance of knowledge held by individuals associated with the organization. This is also true in an educational setting, where learners can often contribute real-world and personal experiences.

The difficulty of capturing this knowledge provides many challenges, in both business and educational settings. In order to be of any use, this knowledge has to be captured at its source and easily disseminated among those who will be interested or affected by this knowledge. The World Wide Web may be a potential technology platform.

The research in progress looks at whether this data/information can be effectively and efficiently captured, managed and retrieved, in an educational context.

1. Introduction

Over the past 10 years my teaching resources have evolved from electronic file sharing to an on-line environment. HTML linked documents in a networked file system allowed for easy distribution of teaching materials and has been the method of choice up to now. The availability of an interactive web server with database support meant that the content could be expanded to use this technology. Using a database approach allows issues that were not well addressed in the file-sharing structure to be investigated. These include: problems of keeping the material current; search facilities and the capturing of student comments and knowledge.

A prototype system has been developed and selected existing content was re-engineered into this format. I have used the system to deliver teaching content to students studying database, multimedia and web design.

2. Content Management and Knowledge Capture

From my observations in an educational setting, I have found that the students can provide valuable resources in one of the two ways. Firstly, students can contribute from their own "real-world" experiences. For example, while teaching coding systems a student who was also a bank employee discussed how account numbers were codified. Secondly, students are often researching the topic whether in a learner directed mode or discovery learning mode. This contribution to the topic knowledge base is often held by the individual and most often lost to their peers.

A second and equally important part the students can play is that of moderation of resources. In one instance recently, a resource indicated that a "modern computer that would support multimedia was a 486 with a large 20MB Hard Drive"! It turned out that the resources became outdated without anyone noticing it in the vast amount of material.

The issue here is how to capture the knowledge and experience from the students, and from others who happen to be there, and place it into the current context. Typically in a web framework this is done via e-mail or through bulletin-boards. In both of these cases the knowledge is separated from the content and time and effort is required to join the content to the knowledge, and, unfortunately often this does not happen.

A content management system is being developed to resolve this problem. A database approach was used and content was normalized into a subject domain. In order to maintain some meaning and structure a backbone taxonomy was created, based on the work of Guarino & Welty (2002).

3. Defining a Sniplet Object

Since the original approach had all the information/knowledge in HTML linked documents, the first task was to develop an entity that would reproduce the static pages. The concept of a small logical piece of knowledge evolved. In some systems (for example, Hyperskript) this is known as a fragment but to enable a progressive definition, the term **sniplet** has been coined. Since 'Learning Object' is a pre-defined term, which has a rather broader meaning, it was not seen as replacing the term "Sniplet". For example, the IEEE (1999) definition of Learning Objects includes learning objectives, persons, organizations, or events.

From the original file sharing system two major requirements emerged to enable content delivery. Firstly, the ability to provide detailed content in the form of handouts, suitable for a printed format, and second to provide a summary suitable for an overhead projector/data-show. After several prototypes, the content fragment that proved to be most workable was **a piece of knowledge or information that could be represented by one overhead transparency,** and in order to provide a way to refer to this, the term "Sniplet" was coined.
Core attributes of the sniplet are:

Sniplet (Creator, id, Backbone taxonomy id, title, description, summary, multimedia id and bibliographic id)

Based on this entity, other related entities were created such as backbone taxonomy, bibliography, and multimedia elements.

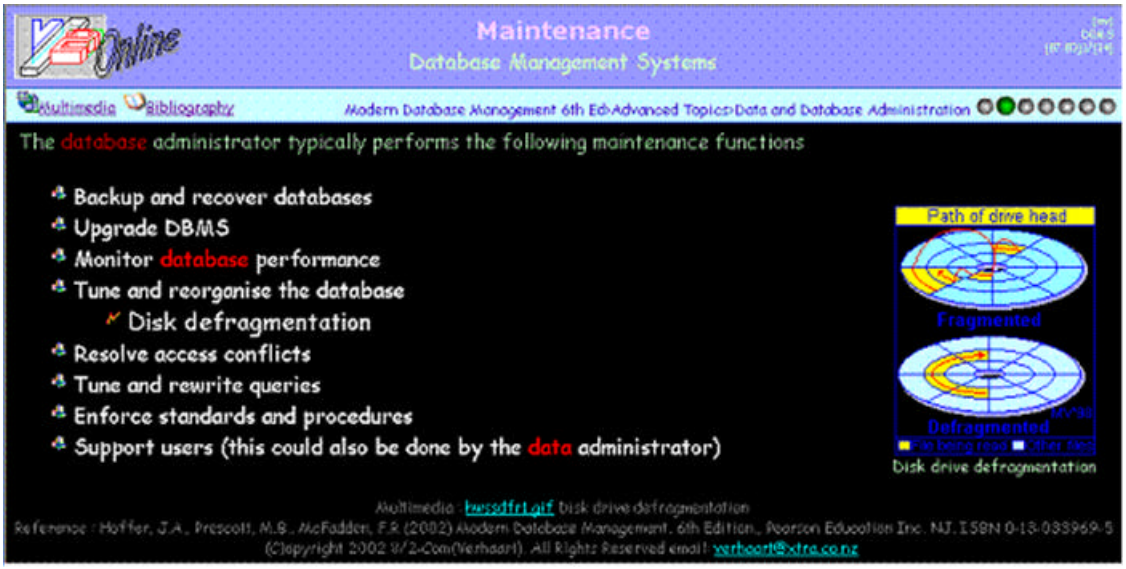

Figure 1. Sample Sniplet

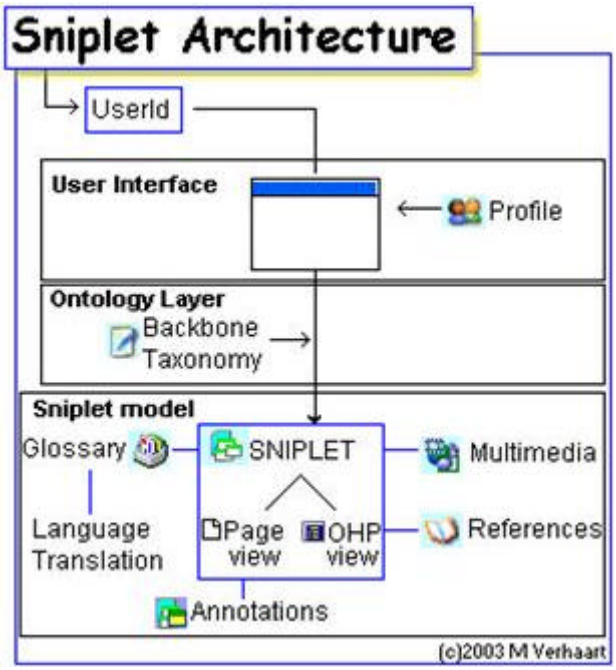

Figure 2. Sniplet Architecture

4. Capturing Knowledge

Once a workable schema was in place, the next task was to enable students to provide input in the system during the learning process. It was seen vital that knowledge capture had to happen within the domain that the students were focusing on (highly contextual), and should represent that context correctly to others.

Principally, two types of knowledge need to be captured. The first is as an annotation to existing content. The techniques of annotation have been found useful to retain context while avoiding unnecessary changes in the original knowledge object (in our case, a Sniplet). On-line news bulletins, such as www.techcentralstation.com, allow discussion treads, user feedback and user ratings directly attached to the article. This technique has been adopted in the sniplet database prototype. Secondly, new content needs to be added to the knowledge base. To maintain the integrity of the knowledge base, only users with suitable access rights should be able to add this level of content, or additions need to be moderated and accepted prior to addition in the knowledge base.

The final part of the content management system is the ability to reorganize the domain content for use in different teaching and learning situations. At this level it will be important that the annotations and any new or additional content are flagged so that any anomalies or updated content can be added to this reorganized taxonomy.

The system is work in progress and can be viewed at http://www25.brinkster.com/verhaart/.

5. Discussion and Research Questions

Here are some issues to consider:

- A sniplet has been defined as "To be useful and usable, the finest grain for any piece of knowledge or information is something that can be represented on a single overhead transparency". Is this over simplistic?
- Knowledge can exist in a variety of forms. For example, a diagram may be an appropriate way to describe an event or concept. Will a textual annotation be sufficient to capture the source knowledge as it can be more easily entered, classified and checked? Just how important is it that annotations can include other multimedia elements such as graphical or verbal?
- Understanding of a topic or concept is often done via formative and summative assessments. If an assessment item is attached to a sniplet, will this be at too fine a grain to be useful? Would attaching assessments to the taxonomy be a better alternative?

- Each sniplet must be attached to a backbone taxonomy which is constructed by the experts in the domain, and allows the sniplet to maintain context and sequence. If you consider the number of text books in a library on any specific domain, each with its own organizational structure, is it possible to create a single taxonomy that will be acceptable to all users of the sniplet domain, or will multiple taxonomies need to be maintained? For example, taxonomies could be slanted in many ways, such as, historical, technical or philosophical.
- Global uniqueness attributes are required for the sniplet, bibliography and multimedia entities. How can this be achieved, without creating unnecessarily complex identifiers?
- Will the ability to annotate or add content improve the quality of the content, or simply add to the cognitive load?

6. References

Guarino,N & Welty, C. (2002). Evaluating Ontological Decisions with OntoClean. *Communications of the ACM, 45* (2), 61-65.

IEEE Learning Technology Standards Committee (LTSC) (1999) Learning Object Metadata, retrieved July 10, 2003 from http://ltsc.ieee.org/doc/wg12/LOM3.6.html.

Post-discussion Summary

1. Introduction

In an IFETS discussion list hosted at http://ifets.ieee.org/ the discussion topic was centered on 'Developing a knowledge capture system based on sharable and self documenting learning objects". The discussion was scheduled from 19–28 May 2003 with the summing-up: 29-30 May 2003. Initially discussion was quiet, but picked up as various threads were developed. In the weeks following the formal closure of discussion many postings were received regarding participation in on-line fora and this will also be covered in this summary.

There were five threads that evolved from the paper:

1. Jianwei ZHANG posed the question What are the differences between "learning technology" and "educational/instructional. Mention of Learning Technology was made in one of the references (IEEE Learning Technology Standards Committee (LTSC) (1999, Sep 5) Learning Object Metadata. Retrieved 6/15/2002 from: http://ltsc.ieee.org/doc/wg12/LOM3.6.html).
2. Mitch Weisburgh indicated WIKI could be used as a knowledge capture system.
3. Mike Neubauer started a thread on knowledge.
4. Mark Nichols started the thread of constructivist (I mentioned in the introductory paper I was a constructivist).
5. To ascertain the need for active participation in on-line for a I posed the question as to whether it was necessary to be active.

2. Learning Technology vs Educational/Instructional Technology

The discussion began with Ziang Jianwei seeking the difference between Learning Technology and Educational/Instructional Technology. Learning technology was mentioned in the discussion paper's references (IEEE Learning Technology Standards Committee (LTSC) (1999, Sep 5) Learning Object Metadata. Retrieved 6/15/2002 from: http://ltsc.ieee.org/doc/wg12/LOM3.6.html).

Pat Alvarado, summised that the terms "Learning Technology" and "Educational/Instructional Technology" are sometimes used interchangeably. And further proposed that we define any separation of these terms to refer to technology used in computer-led environments vs. instructor-led environments. But that regardless of which environment content is delivered, whenever technology is used there must be instructional design adaptation to the specific medium and method in which the content is delivered.

Abid Hussain Khwaja felt that the word technology needed to be understood and proposed that the word technology means application of scientific and other knowledge to practical tasks. Technology should not be

taken as a bag of mechanical tricks, and is not synonymous to machines. Technology in education is to enhance human learning: whether through books or electronic media or even through human medium. In reply, Jeremy Hunsinger summised that he was unsure if technology had anything to do with scientific knowledge at all. Also that the key to conveying our messages to the learners, is to choose the technology that 'fits' the mission, so you first need to know what you are doing when you are teaching your students. He thought that you will find that the educational model of most educational technology is primarily based 'information provision' or 'knowledge acquisition' with little focus on teaching critical thinking or enculturation/socialization.

Jean-Marc Dubois defined the terms as follows. Learning technology" is the use of technology by learners in the learning process. "Instructional technology" is either the use of technology by teachers to help them teach, either the development of "autonomous" instructional products. "Educational Technology" is the part of educational science that studies the use, the development, etc. of technology in teaching and/or in learning. In all cases, technology is not limited to the internet, but refers to videos, videodiscs, CD-ROMs, internet.

Bill Ellis provided alternative definitions. "Educating" or "Instructing" is what you do to someone else. Some call it "brain washing" or "propaganda". "Learning" is what a person does for him or herself. You don't need a "school" to learn. Some believe "education" gets in the way of "learning." "Learning Technology" allows you to follow your own volition. It provides resources so that people can learn what the want when the want and how they want. It's nonlinear. "Educational/instructional technology" sets a curricula to tell people what, when and how to get a job. It's linear. Most cyber learning is linear education. A few individuals are exploring the unique capacity of computers to provide non-linear learning. Brain research tells us that this is the way the brain learns.

3. WIKI

Mitch Weisburgh asked if a Wiki had been considered, as he believed it would allow the comments to be contextualized. Errol Thompson cited a book by Leuf & Cunningham (200?) and indicated that in contrast with the work presented in the discussion paper, a Wiki is much more web page based with the users able to edit the web pages. Some versions include topic maps and other knowledge management techniques. Weblogs are also being incorporated into some Wiki tools. Some of the more feature rich versions possibly come close to what was mentioned in the initial discussion paper.

4. Knowledge

Mike Neubauer indicated that knowledge is gained by forming connections between what is seen now and what was seen before, termed the confusion phase, then by remaining patient, what was known is dislodged by what is new, and knowledge is gained.

Kaylyn Anderson replies that knowledge capture is not the acquiring of new knowledge on top of already known knowledge. Knowledge capture is having a base knowledge of a topic that can be discussed and even argued. When new knowledge is to be gained, it is not replacing what was learned; it is questioned and challenged. If giving a presentation on your ideas and knowledge, you need to be able to understand your methodology, concepts used, the difficulties encountered, the short-comings of your own data collection, lessons learned, and your recommendations. When in business, a "post-mortem" was conducted which is the same process as described. That then becomes knowledge-capture which can effectively be used when encountering new information.

4.1. Bibliographic cross referencing

Referring back to the original discussion paper I indicated that when developing a knowledge capture system it soon became obvious that it was essential that each sniplet (an idea/concept or information representable by an overhead display) needed to have a cross reference to a bibliographic entry. This follows from the comment "Knowledge capture is having a base knowledge of a topic that can be discussed and even argued".

Initially the reference was embedded with the sniplet, but it was found that a good reference was used by many sniplets. Hence, a separate bibliographic entity was created.

Something that I have thought would be really useful, wouldn't it be neat if we could have a huge public bibliographic database, with a user selectable format string to specify preferred style (like APA, as done in software such as endnotes), containing links to the original documents/papers. The real challenge would be to create a unique identifier so that other systems could refer to this huge database.

A search engine agent should then be able to search the documents in reverse to find all papers that use that paper as a reference. It would make citations in papers much easier to manage, and would allow authors such as Kaylyn to follow threads through related papers. This does pose privacy and ownership issues.

Trevor Billany questioned if what is suggested similar to the Web of Science database with its Cited Reference Search enabling articles that have cited a specific work by an author to be found? He further made the comment that, it isn't public and only includes the journals that Web of Science accesses.

William Crosbie suggested the NECs research division site http://citeseer.nj.nec.com/ . From this site the meta-data structure used was BibTex which provided the uniqueness that was being sought.

4.2. Multimedia cross referencing

A similar meta-data structure to the bibliographic one, was requested for multimedia elements such as graphics, sound, animation, video, powerpoint slides, word documents, and so forth.

Dawn Coburn replied that she had been thinking about the Digital Learning Objects project and thought she could see some value in this as the multimedia material will become available to teachers and then could be incorporated as they see fit, into programmes.

The more I work with the sniplet database the more this becomes evident. Attaching some form of meta-data file to each multimedia element does provide a lot of benefits, such as: when a graphic is displayed on the Web the Meta-data can automatically give an Alt tag (useful for accessibility), the size of the image, maybe an alternative image thumbnail and so on. For a video this could include the length of the video, file size, pixel size and a textual description. Bibliographic entities have been around a long while and BibTex is a good example of this kind of metadata.

4.3. Knowledge capture

Mike Neubauer continued the discussion on knowledge capture, He believed that it is more than providing information or bibliographies, but more a way to */interact*/ with the data, information, and bibliography. In other words, knowledge is acquired by interacting with data and information. For example, the common myth about the influence of non-verbals in interpersonal communications.

In the Fall semester eAHSC230 eClass at Concordia University, Montreal at the beginning of a semester's using the LBD eClassroom with thirty students on "Interpersonal Communication and Relationships," 70% of the students believed that 50% or more of interpersonal communication was non-verbal. By the end of the semester 57% of the students believed content was 50% or more of interpersonal communication, not non-verbal.

Now, what to do with it? How to add this to an information database, that when accessed by others becomes part of the issues which challenge how we communicate F2F, and conversely how we communicate online. Some people will look at this data and challenge how it was obtained. Some will look at the data and say, "interesting." Some will say, "I don't believe it." Some will say, "Wow, we need to get more data." And so it goes. Mike would say, "Yes" to all those responses, and it seems, if we had a means for */interacting/* with the data and the responses, then we've gone a long way towards a robust "Knowledge Capture" system that would be significantly different from what is currently available. Finally, concluding that the sniplet concept with attached annotations would be very useful in terms of presentation and evaluation.

Errol Thompson continued the discussion on he sniplet concept, and indicated that the system provided another potential mechanism for potential public discussion and argument of ideas. Readers were allowed to enter notes or annotations, and that this doesn't lead to a discussion forum or to an ability to add to the page as in a Wiki. However, there is potential to be able to move to a discussion stage. A system can never step into someone's mind and force them to debate or evaluate their own ideas. In fact, we can not do that for each other. In reading

Kaylyn's post, he felt this was an element of what she was saying. I am not sure that she is taking the Polanyi perspective of knowledge which I would summarise that you can't have knowledge without a person who knows that knowledge. From this perspective the idea of a knowledge capture system is impossible. It isn't knowledge but rather facts or information that when a person discovers them might become knowledge for that person. So you need to define your terminology with respect to knowledge. Can knowledge in your terms exist without a knower? If so how does it differ from other data that is not considered as knowledge?

4.4. Defining knowledge

From a quotation given by Kaylyn Anderson, "A wise man knows what he know, and he knows what he does not know" a web search found a paper by Dr Phil Goppold. In part 3.6.4 The Art of Not knowing, he makes some interesting observations, in particular the distinction between potential and actual knowledge. Further, he stated, "There is no such thing as knowledge. There is only knowing. Knowing is that "what you have between your ears".

Ania Lian replied that there is no such a thing as knowledge or knowing. All we have are considerations, a word borrowed from JR Saul. These can be thought of as understandings which are relative (hence not absolute) and relational (revealing not telling as it is). She further asked What are questions, and how can one define questions in a way that is epistemologically revealing?

Errol Thompson wrote that one epistemlogical view of knowledge is the idea of "justified true belief". What this is saying is that knowledge is what we believe we have appropriate evidence for to justify our belief that what we take as knowledge is in fact accurate and correct. This view of knowledge leads to the idea that science isn't so much about scientific facts as the process of inquiry that justifies our current view of the world from a scientific perspective. Michael Polanyi to some extent in his work argues this in this way. Knowledge in this sense is personal and it is also community based. The community has the ability to stifle new knowledge if it doesn't fit with its current justified belief. This presents a challenge for teaching since if we hold to this view of knowledge, then we must not only present our current knowledge or fact base but the reasoning and justification for that fact base. That is the inquiry process or the proof process.

Kaylyn Anderson disagreed, and stated Knowledge had better be more than "knowing" or even considerations. Knowledge is being able to put into practice what you have learned; many subsequent postings supported this view. Errol replied that knowledge is built up from the study of the current evidence and practice of the current techniques derived from years of research and practice. All of that research and practice is the current justification for their current knowledge (justified true belief).

Jim Dobbins added to the discussion and thinks an essential component of knowledge is integration. Data is the bits and pieces of what you are given or have accepted as truth. Knowledge, is understanding the meaning and implications of the data and also being able to integrate it into your overall existing knowledge base. He then went on and added some further questions. Is knowledge necessarily accompanied by conclusions? Do we have knowledge until we have made conclusions? Is information/data, in the absence of conclusions, merely information and not knowledge? Is this, in part, the difference between training and education? When trained, we know information. When educated, we understand the implications and are able to draw conclusions about what we have experienced and about what we will experience, because in becoming educated we have expanded our integrated knowledge base and our ability to use it in new ways.

Stephen Downes provided a link to his short article "From Knowledge Management to Learning on Demand" on the topic where he discusses knowledge (refer to the bibliography).

4.5. Knowledge sniplets and context

Dawn Coburn looked at the chunks of "information" that were to be captured and indicated that they seem to be at least partially de-contextualised. As a person who works in the field of Technology Education where we encourage teachers to involve students in dealing with real situations with meaning and interest for the students I am wondering about the purpose for this fragmentation. What is it that is being captured and how is it going to benefit learners? How do students interact with something that is isolated in this way? In reply, I indicated that she was correct, the "sniplet" on its own is de-contextualised, but sniplets have been linked to a backbone taxonomy to maintain the sniplet in context. To allow for reusability, a facilitator (Lecturer/Tutor/Teacher) or

learner creates a copy of the backbone taxonomy and customizes this to their individual needs. (This has not been prototyped, but a structure has been created that I think could work). As the individualised taxonomy still links to the backbone taxonomy, any annotations will be kept with the sniplet and therefore available to anyone in any taxonomy that accesses it. At present only one taxonomy (the backbone) is available.

Dawn further questioned, in terms of your content and the type of annotations expected, additional "facts" to be added, or would you be permitting responses of various sorts to the content? I have worked in varied online environments as a tutor and as a student/participant and while I am heartened by responses from time to time. The best times are when the personal examples come through and they genuinely challenge your thinking, surprise, or allow you to appreciate common ideas. She did not find it an easy environment for collaboration, although the mere fact that we can even attempt to do this with people we have never met is gratifying. The final questioning the post asked what will the benefits be and to whom?. In reply, initially I felt that I was looking for added "facts", but the more I use the system with students, the more I realize the importance of the social content. I am still trialing the technology, and students actually need to interact with the system first before they feel comfortable with using it. Basically they need an exploration and fiddling stage! If this stage is missing they tend to avoid using it. Sometimes I do wonder when students place annotations on a completely unrelated sniplet.

As to the benefits, I tried to indicate this in an earlier email. As I am very Face2Face in delivery, the principal benefit is actually to me as facilitator in that I can create a large database of contextualised facts and information and keep them current. This is by allowing annotations to be added during delivery (I have had a student updating the notes on a wireless LAN while I was teaching with them) and later when they review my notes after class/lectures. The same techniques should be applicable to an on-line course.

4.6. Knowledge capture and annotations

In the on-line sniplet database students are encouraged to add annotations. Errol gives an insight into some of the issues annotations raise in particular the accuracy of the annotation. For example, if a student annotates what is the trueness factor? Or if we look at Face2face discussion, the teacher/tutor/lecturer acts as a truth moderator. If a false annotation is made to an online database should the annotation be removed as it is false, or annotated to indicate the error. Errol argued for the second approach. It isn't necessarily annotating to indicate the error as asking questions that allow the annotator and the reader to explore the truth or falsity of a statement. If we want to foster learning from annotations then we should always foster such debate whether the original annotation is assessed as false or true.

Dawn Coburn added that in terms of the validity of the information added by participants could you expect it to either be sourced, or to be given a basis such as personal opinion, or observed, or an experimental outcome etc? If the source is shown in this way then the signal is given as to how this information could be regarded. People than do not need to be subjected to having their work annotated to show that it is "erroneous" although counter opinions and evidence could be provided.

Bronwyn Hegarty added that sniplets could be in danger of being too specific which has always been her reservation about the use of pools of learning objects. How do the authors control copyrights & issues of modification of their materials or is it a free for all? Freedom of information & the benefits that come from mutual sharing like the good old barter system, rather than producing for economic gain we share our knowledge.

5. Constructivist

Mark Nichols requested any research/online examples of e-Learning courses that could be considered models of the constructivist approach?

Robert Raab of Asia Pacific Regional Technology Centre (APRTC) suggested APRTC's agLe@rn series of courses that focused on the promotion of sustainable natural resource management. These courses are targeted at developing country "knowledge intermediaris" and follow the contructivist approach. All content is in the public domain and can be accessed from APRTC's Website at - http://www.aprtc.org. Some of the list members visited the site and a common question was where these courses considered to follow constructivist design principles even though they appear to be quite linear and structured.

Robert suggested that to their way of thinking, a defining feature of the constructivist approach is that the learner is encouraged to construct their own understanding of the topics covered in the course. There are no universal "right" answers. Participants are given access to a range of informational resources (some of which may be contradictory) and given the opportunity to critically evaluate the information and draw conclusions based on their own experience and circumstances. Another important feature of this approach is that it is supported by encouraging intensive interactive dialogue with other students in the class and comments from subject matter expert facilitators. This may be difficult to see without being able to access what is going on in the discussion boards and email exchanges which are considerable. An invitation was extended to list members who wished to "sit in" and observe one of the courses.

Robert further indicated that the courses are quite structured and linear. They found that this is good for a number of reasons. One, it tends to ensure that students are thinking about and discussing the same topics at the same time. This is important for being able to share views and ideas. Another benefit is that busy students (all our participants are working adults) do not have to spend too much time thinking about what to do next. In earlier versions of these courses participants were given more freedom to work outside of the structure but the feedback received was overwhelmingly in favor of more structure. For a discussion of some of our experiences list members might want to take a look at "Making e-Learning Work in the Asia Pacific: Lessons Learned".- http://www.aprtc.org/occasional_papers/itirapr.htm.

This concurs with the initial discussion document where keeping content, discussion and learning in context are important considerations for effective learning.

Deirdre Bonnycastle described a constructivist on-line "Gender Studies" course as follows. There were five modules (that's the linear aspect). In each module, there are a series of readings that everyone is expected to read. Three or four students are expected to write a 400 word "This is what my understanding of the reading is..." The other students are then expected to discuss what the other students say. At the same time, 3 or 4 other students will be doing a WebQuest that they present. At the end of the discussion, the instructor posts comments. The writing and WebQuest are worth 30% of the students marks. This was piloted with 40 students and the students loved it. The amount of participation was very high in quantity and quality. In their final papers many of the students quoted what other students had said. In future the number of students are to be limited to 20 (there were over 500 postings) just to save the instructors sanity.

Mike Neubauer continued the discussion with a further example. In the synchronous LBD eClassroom a measurement was used during the activity phase of the weekly three hour sessions that somewhat codified the constructivist component of the interaction. It is described in a paper published October 2002 in the IRRODL, URL http://www.irrodl.org/content/v3.2/lns.html

Basically, the following measure was used: The number of posts were counted, and categorized in terms of Student-to-Student interactions, Student-to-Facilitator interaction, and Student-to-Group interactions. Four phases were defined, which seemed to mark differences between the rates of interaction during the two hour activity. So right after the activity was Phase I we called "Adding Knowledge to the Group" where Student-to-Group was highest; Phase II was "Facilitation" where Student-to-Facilitator was the highest; Phase III was "Building on the knowledge of others" where Student-to-Student interaction was highest; and finally Phase IV we called "Reporting back to the Group" where student-to-group interaction was highest. We also graphed these phases along a two hour time-axis, where the 'Y' axis was the number of messages per minute.

Surprising, these constructivist phases were consistent during the semester as each three hour online session was a new activity in the eClass on "Interpersonal Communication and Relationships." There were no F2F components during this semester's eClass.

James L. Morrison, Editor-in-Chief of The Technology Source indicated that a number of articles in The Technology Source have been published that describe using the constructivist approach. The article "University 2 Diversity: The Story of 2 Live Class" at http://ts.mivu.org/default.asp?show=article&id=852 , by Bob King and Tom Smith's article describing how they applied this approach, and by clicking on the "read related" option in the Interact! menu of their article, other articles can be viewed that have been published in this area. In the July/August issues are two articles focus on using constructivist principles in education (http://ts.mivu.org). Further examples are listed in the Bibliography/Reference section.

6. On-line participation

In an on-line discussion the active participation of those involved was introduced. The comment that effectiveness or otherwise of on-line discussion requires students to actively contribute. For example there are in excess of 4,500 individuals that are on this list server and not all participate in the discussion. It is often quoted in papers of on-line learning that "Students do not use/contribute to on-line systems unless there is an assessment component". Two questions were posed, what research that has been done in this area, and what factors encourage students to participate. This led to considerable discussion.

Muhammad Betz indicates one large on-line university requires student participation in online discussions by stipulating the number of days a week that each student must post substantial messages, ranging from 100-300 words. Each student's contributions are then totaled at week's end and a "Participation" grade assigned for that week.

Gaye Kelly discussed some preliminary findings conducted on a cohort of unemployed adults of varied ages, backgrounds and ability in a a closed group discussion board. She indicated the problems with lack of spell checking as the postings were very public. One interesting finding was that those who used the discussion board to reflect were more likely to be older and better educated. As the skills levels of the group increased and their confidence in the technology also increased, there was increased participation. We should not assume that users know how to use the technology.

Dave Bremer and others, pointed out that in an on-line discussion if everyone participated actively , we would be shattered - even in a so-called "whole class (face to face) discussion". If the discussion has any educational merits at all then it should stand on its own and should not require any artificial stimulus such as a required contribution. Quite submissions are made that are reluctant submissions from someone with nothing to add but who is compelled to say something (anything!).He believed that research could show that a greater percentage of students contribute if they are required to do so (of course they would) ... but would be most interested in any research that shows a difference in the quality of submissions due to those requirements - or that shows an educational benefit was gained by forcing people to contribute when they would rather listen. Those of us who are merely listening are indeed participants in a discussion.

Mike Neubauer has conducted some research into participators and listeners, by having all students request the data. This allowed for a measurable participation rate and this research was published and the ratios were graphed in Figure 4 of the IRRODL article, at http://www.irrodl.org/content/v3.2/lns.html.

Peter Miller added that the teacher is not just a provider of information. A teacher uses all sorts of carrots and sticks to encourage all the learners to become involved. Participation in a listserv is one way being and keeping involved. He had another belief, that much work in industry is done by a participating group and thus skills in participating are a valuable addition to technical skills. The job advertisements say "... must be a team player." We need to encourage that.

Peter Twining gave some references to research in this area at the Open University (UK), at the Knowledge Network generally (http://kn.open.ac.uk/public) – searching for assessment will bring up over 100 documents most of which are about CMC and assessment and many of which are 'research based', or look at http://kn.open.ac.uk/public/document.cfm?documentid=1268 which looks at the issue of student participation and assessment in the context of a 'constructivist' (if you must) distance education course. He also indicated that "many" lurkers post quite a lot of emails to individual people who have posted in this list - you just don't see them because they tend not to reply to the list as a whole.

Prof. Dr. M. Yasar Ozden provided some interim statistics on research currently underway at the Middle East Technicla University, Turkey. Some interesting results include, in one course 52 students have posted 1415 messages, and in a fully distance course 48 members posted 987. He also stated that the grading policy forces students to use online communication and collaboration tools even they resist at the beginning.

Dennis Nelson posed some reflective quotes, “I'm a resident of a place whether a hermit or elder, registered or not” and “I'm implicated if at the scene of a crime, participant, victim, spectator or sleeper”.

Carlos Gonzalez believed that the lack of participation by students in discussions boards could be due to, feeling uncomfortable with the idea of making mistakes, personality traits (i.e. introversion/ extroversion), personal

circumstances (lack of time) and preferred mode of learning. This was supported by the works of (Guiora et. al's,1972; Ehrman,1999 and Jones et al, 1997).

Naomi Jeffery Petersen introduced the view that participation needed to be tied to the reason for participation. This may have to do with one's view of assessments and what grades are for, but also what the function of personal interaction is regarding the goals of the course. Ultimately this is governed by learning theory. Using grades as a reward assumes a behaviorist learning theory that is known to be counterproductive: the more extrinsic motivation is used, the less intrinsic motivation occurs. She feels strongly that passivity not only should not be rewarded in class as well as online, but it should not be tolerated. We have enough slugs absorbing the entertainment value of television without perpetuating the same consumer orientation toward classes. We must define all activity within a course in terms of the goals of that course, and whether it is for developing or demonstrating those goals.

Bill Williams discussed some findings in a small (unpublished) study carried out on factors contributing to a high level of participation in sections of an international online post-graduate course (where participation was not being assessed). He concluded that the biggest factor in encouraging a high level of participation was the design of the learning task (in effect how "collaborative" it was). The next most significant factor seemed to be the role of the tutor/moderator.

Ania Lian (with support from Prof. Dr. M. Yasar Ozden and Pia Hall), indicated that we may need to more clear in regards to the objectives of our teaching so that we do not assess on-line participation (unless it is the participation that we are looking for) but, in fact, the attainment of the objectives that we seek out.

Mary indicated that participation could also be related to the limitations of the platform on which we are delivering it. Introducing the ability to indicate support without restating the message such as by the use of abbreviations such as putting [NFM] in the subject line to signify "No Further Message", can allow for the fora that do not want me-too messages posted.

Keith Tyler-Smith added the term Read-only participant (ROP) to signify those that lurk in a discussion list.

Mitch Weisburgh looked at the possible goals in why are we interested in whether, or how often, students participate. His goals included;

1. The need for the instructor to get some feedback (how well are people learning, are students actually paying attention).
2. Participation, by its nature, is a learning activity.
3. Participation promotes different views to surface.
4. Participation, and responses to a posting, are a form of feedback to the students.
5. Participation is a way to assess the learning that has occurred and/or grade the students.
6. It's more interesting for the instructor if students interact.
7. It's expected that students interact, and if they don't, it's an indication that something is wrong.

Michael Lawrence-Slater added some other insights into the reason for on-line participation. Primarily that it is another line of communication, especially in large classes where one-to-one contact with a lecturer may be very difficult, such as in a large class.

7. Finally

Many thanks to all those who participated, both actively and as Read-only-Participants. I hope this discussion has provided you with an opportunity to converse with peers and that you have derived further knowledge from it. I have tried to include and organize the discussion treads, and hope that in doing so I have not put you comments out of context. There were just over 100 relevant postings to the discussion.

A complementary survey on some of the issues was placed on http://www25.brinkster.com/verhaart/ and an analysis of the raw data is enclosed in appendix 1.

8. Quotations

Some of the lists participants also provided related quotes; these are included as follows:

- What matters most is not the moment when the student uses the technology, but how that use promotes improvement in that student's education. - S. Ehrmann.
- A wise man knows what he know, and he knows what he does not know.
- "How do I know what I think until I hear what I say?" W H Auden.
- "Better to say nothing and be thought a fool than open your mouth and remove all possible doubt" – old proverb.

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Appendix 1

IFETS/DEANZ Discussion List Questionnaire

As part of the feedback on the discussion '**Developing a knowledge capture system based on sharable and self documenting learning objects**" a questionnaire was initiated. This was collected at http://www25.brinkster.com/verhaart/.

There were 30 responses to the questionnaire. Following is a summary of those results.

1. Demographic summary

Country		
No response	2	7%
AUSTRALIA	3	10%
CANADA	1	3%
HUNGARY	1	3%
IRELAND	1	3%
MALAYSIA	1	3%
MEXICO	1	3%
NEW ZEALAND	7	23%
PAKISTAN	1	3%
SPAIN	1	3%
SWEDEN	1	3%
UNITED KINGDOM	4	13%
UNITED STATES	6	20%
Gender		
No response	2	7%
Female	15	50%
Male	13	43%
Age Range		
No response	2	7%
21-30	3	10%
31-40	2	7%
41-50	15	50%
51-60	7	23%
61-	1	3%

2. Questionnaire results

IFETS/DEANZ Discussion forum

1.	**I read the initial discussion paper. Add any comments.**
1	Certainly very stimulating and provided a great deal of scope for discussion.
2	through lack of time. Caught up with the discussion late in the piece.
1	A very interesting concept, if it can be made really easy to use for not very IT literate people it could have wide application
2	I think that I must have come into the forum late.
2	just occasional lurker
1	I think the whole matter deserves a far more considered approach than to simply label approaches without exploring the potential for the species
	1.Yes 20 71% 2.No 8 28% Total *28*
2.	**I viewed the web site prototype (www25.brinkster.com/verhaart). Add any comments.**
1	Seemed to work well. I found the Interface design a little off putting at first, perhaps it was the colour scheme. Added an annotation and found it easy to use.
1	passwords are a drag
2	no time
	1.Yes 14 56% 2.No 11 44% Total *25*
3.	**It was suggested in the discussion that we can be listeners or participants. With regard to the postings, what was your involvement in the discussion? Add any comments.**
0	Did three of the four options - read and thought, responded privately, posted in list.
2	Posted one response, but essentially followed the discussion later this time.
4	I normally only get involved if I feel the discussion is relevant to my interests. In these forms, I seldom initiate a discussion unless I have an issue that I want discussed.
2	Discussion was interesting but peripheral to my current work
4	Actually, to all of the last three options.
2	Currently under time pressure with other work and the discussion came at an unfortunately busy period. But the discussion was excellent and has been carefully collated for reference
1	1. Did not read (most times) 2. Read and thought about (at times) 3. Responded privately to authors (except now!)
2	Those issues that caused my desire to respond were covered prior to my reply by others expressing my views.
2	Think that I might be a delayed participant and when I was ready to add my comments the discussion and attention of others had passed on and therefore felt I had lost the opportunity with all of the implications this offered for my personal motivation.
	1.Did not read 3 13% 2.Read and thought about 16 72% 3.Responded privately to authors 0 4. Posted message(s). 3 13% Total *22*
4.	**I agree with the statement that we can be active learners without participating in the online discussion. Any comments?**
1	I do this regularly - lists like this are often a prime source of information for me. Only occasionally, mostly as a factor of time availability, do I find myself drawn into the discussions.

1	But - issues about mutual benefits (lurkers benefit themselves but do they benefit others?) and I believe that active participation (ie posting as well as reading/thinking) enhances learning.
1	Usually I respond as well as read, but this time I was just an observer. I have to tell you that I felt a little like a parasite. A parasite may have an "active" life, but it is still sucking the life from others. Another difference was that, when I contribute, my ideas often get refined/improved. From just reading, I can formulate ideas, but they are not then forged on the irons of constructive criticism.
2	I may learn from reading the material but unless I enter into the discussion, my own interpretation is not challenged. Expressing my views is a way of clarifying what I know.
2	Active learners need participation..
0	Yes and no: active learning requires some element of reflecting on the experience and making a mental image of the relevant domain. It is possible to hear or read something and not take it on board. At least by contributing you are reflecting to yourself as well as others and thereby constructing your own learning. Without this active involvement it is possible for the information to be received in one ear and out the other!
1	In order to be an active learner, one needs to actively do something with the material. Whether it be reflection, updating a course, starting new research, whatever. Simply reading is not enough.
1	Indeed I do. A couple of comments: I think it an odd notion that just because something may be done, that it must be done. The Internet has spawned the interesting phenomenon of immediate responsivity with the expectation that an email will immediately be answered by the recipient. I have found in my life that I have learned as much by listening, reading and synthesizing the resulting thoughts as ever I did from uninformed discussion on the same topics. In my view, enforcing moderated participation postings which are then commented on by the moderator can lead to a topic becoming directed by the moderator - surely an undesirable outcome. Of course, at the other end of the spectrum, uninformed e-babble can also be an abuse of the medium. In the latter case, however, I find that the participants tend to self-moderate which seems to me a much better model.
1	More likely to agree if the word "could" was substituted for "can be" But a definite no if the expectation of the process was for assessment of learning purposes
1	but we are not making the discussion (or the collective task in progress, if any) benefit from our activity.
1	I firmly believe that participation increases my learning, especially if my initial cognitive level on the subject matter is weak or non-existent. Also in a group or class; participation by the one increases the potential learning of the group, the opposite of which implies that for each learner that does not participate there is a quantity of learning opportunity for the remainder of the group that is lost.
1	what is needed are more studies that aim to capture the why and how students participate and what the benefits/drawbacks for them of this particular approach might include. Then we can aim our speculations more effectively into the impact of particular engagement strategies and the impact/effect they have on learners, hopefully with the aim at some stage of developing a test that will flag up optimum engagement strategies for learners.
	1.Yes 17 89% 2.No 2 10% Total *19*

Additional comments

5.	**Would you like to add any other additional comments?**
	in my subjects all of the subject-related and almost all of the student-generated material is available online for all participants. In consequence and to cater for different learning styles, I use a number of online participatory activities of which postings to discussion boards and chat are but two.
	Whether your understanding, interpretation and synthesis stands up to scrutiny (self or otherwise) I personally believe it requires more than a passive involvement. As a "lurker" I believe I have missed a key opportunity at this point in time but that was a conscious decision on my part as noted above.
	would like to know the results of the evaluation