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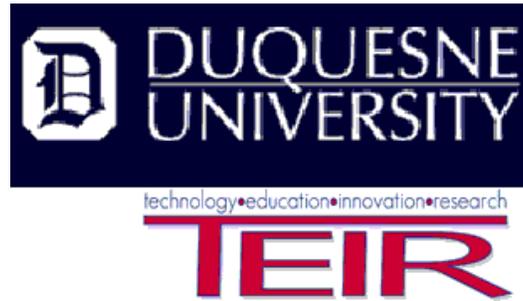
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This Journal was established to facilitate collaboration and communication among researchers, innovators, practitioners, and administrators of education and training programs involving technology and distance learning.

An academic institution, Duquesne University, was chosen for its commitment to academic excellence and exemplary programs in instructional technology and distance learning. Duquesne University is supporting the Journal through its graduate program in Instructional Technology and its Center for Technology Education Innovation and Research (TEIR Center). In addition to its educational programs, Duquesne University has major training contracts for industry and government.

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Editorial

Competing Futures

Donald G. Perrin

Pessimists focus on problems; optimists run with opportunities. The future is our only opportunity to better the past. We cannot change the past but we can influence the future. Why are we continually drawn back into the world that was? Is the comfort of what is known more intriguing than the unknown? Who or what controls the future? And what is *our* role?

If we look at a time continuum, the present is a fine line that separates the past from the future. The seeds of change already exist if we can recognize them. Man studied the earth, sun, planets, and solar system for tens of thousands of years. It was Galileo with his telescope that proved the earth was round. This new knowledge resulted in a paradigm shift that literally changed the future and the history of the world. Seeds of change surround us in education today – audiovisual media, electronic communications, interactivity, knowledge bases, search engines, learning objects ... the list seems endless because each innovation leads to another. Change is accelerating to light speed as technology negates conflicts of time, distance, and cost.

We teach history but do not require future studies. The tools of the futurist are basic to research and development, but the future affects everyone, and everyone is part of the future. Do you want to accept the future somebody else designs for you? Or do you want to be part of the process? You cannot change the past, but you can exercise a great deal of control over your own future and positively influence the future of your family, professional associates, communities, and students.

The tools of the futurist include experience, curiosity, observation, an open mind, research, data, statistics, creative exploration of ideas, expert assessment, modeling, and an action plan. Social, cultural, and environmental dimensions should be examined to anticipate the impact of change and possible second and third order changes. Let me illustrate:

A few weeks ago, *Space One* climbed to 64,000 feet to become the first privately developed vehicle to touch the edge of space and successfully negotiate reentry and landing. It was developed by an aircraft designer (experience) who solved the problem of reentry based on the design of a shuttlecock (curiosity, observation, and open mind). He observed that feathers controlled the direction of the shuttlecock and ball always landed down with feathers up. He applied and tested his design concept with aircraft (research, data, statistics, creative exploration of ideas, expert assessment, modeling). On *Space One*, the trailing rear wing is raised to create a drag like the feather on a shuttlecock (action plan). The drag slows the spacecraft at the edge of space to prevent excessive heating. And the drag ensures the spacecraft will always land upright. Social, cultural, and environmental implications are numerous. *Space One* opens space to private enterprise for research, exploration, and travel. Its second and third order effects will be economic (creating a new industry), political (control by government), and military (new defense systems).

The course of history is changed by wars, natural disasters, and technology. Futurists will tell you that, throughout history, *technology* is the most powerful agent for change. Instructional technology and distance learning are major forces in education today. We have new opportunities. We can create a better future for learners everywhere.

In this issue, Stephen Downes leads us into the future of Learning Objects. Sarah Cornelius shows a practical application of Learning Objects with e-MapScholar. Federico Casalegno and Irene McAra Mc William explore collaborative learning environments between dissimilar cultures, and Stephanie Clemons examines Visual / Kinesthetic Learning in her global classroom.

Editor's Note: This is the text of the [Buntine Oration](#), delivered to the [Australian College of Educators](#) (ACE) and the [Australian Council of Educational Leaders](#) (ACEL) conference in Perth, Australia, October 9, 2004. The biennial Buntine Oration is a bequest to the Australian College of Educators by the Buntine family.

Dr. Walter Murray Buntine is remembered for his contributions to education in the State of Victoria, the University of Melbourne, and as Headmaster of the Caulfield Grammar School. The editors thank Chris Cameron, Program Manager of the Australian College of Educators, for publication clearance.

This is Stephen Downes at his best – provocative, challenging, and enlightening. He leads us with passion and conviction into a future of education and the internet that is diametrically opposed to the approach taken by publishing companies. He also raises serious questions about “member only” systems of learning. Stephen Downes benchmark for open learning is Google speed, power, and selection criteria. Through the magic of the Internet, here is entire 40 minutes of his presentation in Australia.

The Buntine Oration: Learning Networks

Stephen Downes

00:00 Introduction

Thank you. It is an honour and a privilege to be able to address you here today. On behalf of the National Research Council and the people of Canada, greetings.

I am by vocation a learning technologist, a researcher, a sometime programmer, a speaker and writer, and a passionate believer in the value and importance of education. I am by education a writer and philosopher, a student as much of Wittgenstein as of Piaget, as much of Descartes as of Dewey. I am indeed lucky that by this time in my life my pleasures have become my pursuits; I often tell people that I do for a living what I would do for fun in my free time, if I had any.

As I prepared for this talk in my mind – because nothing would translate into writing – I prepared for this talk by giving a series of other talks across Australia, traveling from the Top End to Tassie, from the Red Centre to the Barrier Reef. I talked about learning standards and learning object metadata, learning management systems, content management systems, the new student and old traditions, the affordances of technology, barriers to learning, open source and open access, knowledge management, knowledge generation, language, literature and new media.

I wasn't so much speaking as listening, not so much showing as searching. I am a student of learning technology, but learning technology is for me becoming increasingly empty.

I don't know if I found what I was looking for. But I did find this, nailed to the wall of a wooden building on the west coast of Tasmania:

"If we can revise our attitudes towards the land under our feet, if we can accept a role of steward, and depart from the role of conqueror, if we can accept the view that man and nature are inseparable parts of the unified whole – then Tasmania can be a shining beacon in a dull, uniform, and largely artificial world."
Olegas Truchanas, 1971.

In 1971, I was in grade seven, in a dull, uniform and largely artificial world, and possibly at the very time these words were written, organizing my fellow students as we stood in a line to enter our class to put our hands on our heads and make clanking sounds like chains, the condemned. I do not regret my stint in the Principal's office for what was, after all, a political crime. But as I stood before this building in the wind and the rain in Strahan, waiting for my bus, I realized, that we have been and are doing the same thing to ourselves as we have to the trees and the forests, and that the same thing that will save Tasmania, will save me.

03:00 Learning Objects

In 1995 or so I found myself working for Assiniboine Community College in Brandon, Manitoba, a small city of 40,000 people on the wheat fields of western Canada, working, on the one hand, to prepare college materials for distance delivery, and on the other hand, to prepare the college and the community for the advantages the internet would offer the world of learning.

At Assiniboine I built a learning management system, something we called OLe, short for 'Online Learning Environment', a computer program designed for the World Wide Web that would be like an online learning manual, but better. And I had the idea that units of learning, what we called 'modules', could be designed in such a way as to be reused in one course or another. Unknown to me, another Canadian, Wayne Hodgins, had had the same idea, and instead of calling them 'modules' he called them 'learning objects'.

Hodgins explained,

"My journey into this world of learning objects started with an 'epiphany moment' watching my children play with LEGO blocks many years ago... I began what has been more than ten years of refining a dream of a world where all "content" exists at just the right and lowest possible size, much like the individual blocks that make up LEGO systems." (Hodgins, 2002)

This early vision has undergone numerous changes since its inception, though the concept has remained the same. Learning objects are small bits of reusable digital content that can be used to support learning. How they fit together became terribly important, and so there was much debate about the correct analogy to use. Learning objects were thus more like atoms, for example. Or there should be things like data objects and knowledge objects, which would instead be combined to form sharable courseware objects. Hodgins himself abandoned the Lego metaphor, recommending instead what he called a multi level content taxonomy. (Hodgins, 2002)

The idea caught the attention of the educational community, and so while I was still at Assiniboine the first draft of the influential IMS Meta-Data Specification (IMS, 1999), describing the concept of the learning object in exquisite detail, landed on my desk with a thud. I printed it out and enthusiastically showed it to my colleagues and said, "This, this is what the next version of OLe will have to conform to." They looked at the inch-thick document and said something I will loosely translate as, "You've got to be kidding."

Despite their initial skepticism I was convinced and while I never did program an IMS compatible version of OLe, the idea, it seemed to me, was sound, and when a few years later at the University of Alberta I wrote the paper 'Learning Objects' I had in my mind already well rehearsed the argument in favour of reusable digital learning content. It made no sense, I argued, to produce the same module in trigonometry or Shakespeare over and over again; the principles of mathematics and the language of literature were quite unlikely to change one year to the next.

06:00 Two Visions of Online Learning

For a while, I was completely in synch with the rest of the world. My paper was at the top of the Google listings for 'learning objects'. And it had become apparent not only to myself but to the rest of the education technology community that learning objects would have wide applicability not only in distance learning but learning in general. And it became apparent not only to myself but to the community as a whole that the use of web based materials would change the nature of teaching itself, that teachers would, as the old saying goes, become a guide by the side instead of a sage on the stage.

I had this vision, you see, that the use of learning objects would, in effect, make learning content seamlessly and effortlessly available not only to all students, but to all people in the world who wished to learn, and that the portability and reusability of learning objects meant that we could develop an educational environment where students were not marched in lockstep through a predefined curriculum but instead could have the freedom and capacity to explore the world of learning according to their own interests and their own whims. Learning, genuinely free and accessible learning, could be produced and shared by all.

I may have been in synch with the rest of the world, but it would not last long. While I was thinking of what the educational system could become, the network of publishers and software developers and educational institutions that developed around the concept of learning objects had a very different idea.

Here's what it would be. Learning resources would be authored by instructors or (more likely) publishing companies, organized using sequencing or learning design, assigned digital rights and licenses, packaged, compressed, encrypted and stored in an institutional repository. They would be searched for, located, and retrieved through something called a federated search system, retrieved, and stored locally in something called a learning content management system. When needed, they would then be unpacked and displayed to the student, a student who, using a learning management system, would follow the directions set out by the learning designer, work his or her way through the material, maybe do a quiz, maybe participate in a course-based online discussion.

That's the picture. That's the brave new world of online learning. And honestly, it seems to me that at every point where they could have got it wrong, they did. And though I don't have a lot of time, I'm going to linger here a bit and draw out a few features of today's online learning. Not just to show in detail why I think they are wrong – through there is a certain pleasure in this – but to analyze why I think they went wrong, and therefore, where I think we ought to go instead.

I don't have the time in today's short talk to look at everything, but a look at three aspects of the new system should be enough to prove the point: content packaging, federated search, and learning design.

09:00 Content Packaging

Educational content has long been the domain of the publication industry, and while perhaps some professors felt that the new technology might result in a new type of publication, it is equally true that existing publishers believed they had discovered new markets. It is no coincidence that one of the earliest entrants into the field (and still an important player today), NetG, which introduced 'NetG Learning Objects', is owned by Thomson publishing. Learning object metadata has been formalized as IEEE as 1484.12.1 Learning Object Metadata, and adapted by the U.S. military as a requirement for all providers as a standard called SCORM, or the Sharable Courseware Object Reference Model.

In order to satisfy the needs of the publishing industry, the second specification undertaken by IMS was something called 'content packaging'. The analogy between the digital package and, say, a book or a magazine, is obvious and deliberate. In this model, groups of learning objects are assembled to form courseware; this courseware is packed and compressed (or 'zipped') and then sold as a bundle to an educational institution. The bundle is then delivered, either on a CD-ROM or via the internet, where it is loaded into a Learning Content Management System, to be routed for delivery to the student on a learning management system.

From my perspective, this model is about as far from the model of the internet as one could get and still be in the realm of digital content. It resembles much more a school library or a CD collection than it does the World Wide Web. It also resembles the way publishing companies view the sale of digital journal subscriptions and e-books, as prepackaged content, the use of which is tightly controlled, or of software, complete with encryption and registration, that has to be licensed in order to be used, and requires an installation process and close interaction with an operating system, in this case the LMS. And, of course, without an LMS, the learning content is effectively useless. You can't just view it on your web browser.

From my perspective, if online learning held the promise of reducing the cost of learning materials and opening access to all, this model effectively took it away. Even for educational institutions, the cost of entry is the purchase of an LMS and an LCMS. Although content could in theory be authored by school or college staff, the requirements of metadata, packaging and compressing entail the use of expensive authoring tools. There is moreover no effective way to share learning content with other institutions, no such thing as a web of learning objects, no such thing as a Google to help instructors find them. It is, quite literally, a separate internet, one which is likely to become more separate still.

12:00 Federated Search

Because learning objects are invisible to Google, there have been several projects designed to make them discoverable; for the last two years I have been involved in one of them, the eduSource project, based in Canada, which has as its objective the linking of collections of learning objects, known as repositories, to support what is called a federated search. In the e-learning world in general this has been the next new thing; IMS has released a Digital Repositories specification, and instead of Google, operators of learning content management systems are intended to access these federated searches.

Without lingering on this for too long, let me say that a federated search is everything that Google isn't. With Google, information about every website in the world is collected in one place; the user accesses the Google interface and searches it all at once. In a federated search, the information – in this case, the learning object metadata – stays where it is, in individual repositories. When a person conducts a search, this search is sent to each repository in the network individually. Thus, if there are ten repositories in a federated search network, the search is conducted ten times, once on each repository, and the results are sent back to the searcher.

If this process seems odd and cumbersome, it is. In practice, the federated search over even a small number of repositories is significantly slower than Google. It is also exclusive; in order to be a member of the federated search network, it is necessary that a repository be able to support an instance of each and every search. It's like requiring that every website have the capacity of Google. But most importantly, it exercises control over the search results. Because metadata originates only from the source repository at the time of the search, access to the metadata can be blocked if, for example, the searcher does not have the appropriate license. Moreover, the only information about a learning resource to be had is that information provided by the vendor.

What Google has, that a federated search system by definition cannot have, is what I call third party metadata and what Google calls PageRank. In order to order search results, what Google does, essentially, is collect information about what other people think of the resource, and to incorporate that into its search. For example, Google counts the links from other sites to the resource in question, and if many people link to the resource, it is ranked higher. No such ranking is available to searchers in a federated search network; the only ranking possible is that provided by the vendor, and that is rather more likely to have to do with the vendor's business model than any third party information about quality, classification, usability or suitability.

15:00 Learning Design

In a learning management system, learning objects must be displayed to the student. In the world of learning objects the IMS way, learning is completely contained within the content package. The manner in which these objects are presented to the student is called Learning Design, and is the subject of yet another IMS specification.

Learning design follows from an earlier IMS specification called ‘Simple Sequencing’, and the name of the former suggests the direction of the latter. Learning design has its roots in computer based training, and is essentially the definition of a set of interactions and activities that present materials to students based on their responses to things like tests or quizzes. The analogy employed by the designers of the Learning Design is that of the play, where learners take on various roles, and where the learning design document itself acts as a script, the learning management system as the director.

In other words, the model has become such that learning objects, insofar as they support learning, must necessarily come with specific learning objectives, in order to fit into the learning design. Indeed, the more explicit a learning objective is, the better a learning object is, because it can be used explicitly in this or that learning design. But as Wiley argues in his paper ‘The Reusability Paradox’, the more specifically defined the learning objective of a learning object, the less reusable it becomes, until you get to the point where a learning object may be used by one, and only one, learning design.

Indeed, learning design and learning objects essentially amount to the same thing, because the paradox works in the other direction as well. In order for Learning Design, the specification, to work as advertised, it must control the selection and display of learning objects. But in order to do this, you have to know what objects you are going to select and display. A script has to have lines; it’s not improv. So someone must select the set of learning objects to use in a given learning design, and to put this list in the learning design itself. This means that a new learning design must be authored for each unique learning objective.

Learning Design is, in my opinion, very much a dead end. A dead end not because it results in e-learning that is linear, predictable and boring, though it is that. A dead end not because it reduces interaction to a state of semi-literate yes-no, true-false multiple choice questions, though it is that. It is a dead end because it is no advantage over the old system – it doesn’t take advantage of the online environment at all; it just becomes an electronic way to standardize traditional class planning. It’s not cheaper, it’s not more flexible, and it’s not more accessible.

18:00 What Went Wrong

So what went wrong? I mean, it’s easy to say that the systems are too expensive, the learning too boring, the search too cumbersome, the reusable objects too not reusable. What matters here is that I be able to explain why the existing model is inadequate, and how it differs from the model that is worth emulating, the one that I have suggested, and now say explicitly, is the model instantiated by the World Wide Web itself.

It has been observed many times that a new technology evolves in two stages. In the first stage, it emulates previous practice. Thus, for example, when movies were first introduced, they were essentially recordings of stage plays, with a single camera located in the position of the audience. Only later did we get multiple camera angles, zooms and fades. Similarly, the refrigerator began as the ice box, and only later did we get air conditioning, ice-cube makers, and an ice rink

resurfacers known as the Zamboni. Early automobiles were known explicitly as horseless carriages, and only later did we get motor coaches, transports and interstate highways.

Online learning has evolved in very much the same way. The learning management system was designed explicitly to emulate traditional practice. The basic unit and structure of instruction remained the course; the basic unit of person remained the class, and for the most part, albeit with new technology, the time-honored techniques of instructional delivery, interaction and testing were emulated in this new environment. If learning management systems imported anything new to traditional learning, they did so through migration from existing practice in distance learning.

We talked about the discussion of a metaphor for learning objects. But the idea of the learning object has drifted far from the idea of learning objects as atoms, or even of learning objects as Lego blocks. Indeed, on observation, it could be said that if any metaphor applies to learning objects, it would be that of the word in a sentence, the line in a play. The use of the learning object has become, in practice, not the combining of individual entities, but the arrangement of them, learning object metadata forming a vocabulary, learning design creating a syntax, content packaging assembling them into a book, federated search acting as a bookstore or (at best) interlibrary loan.

And if language is the metaphor, then language itself is the problem. For everything that language is – static, linear, structured, ordered, hierarchal – the internet isn't. We are locked in language. We are locked into the structure of language, the ordered, neat idea that language represents, the management, the organization, language as plan, language as structure, language as order, the world made neat, and tidy – the world made dull, uniform, and largely artificial. We must leave language behind, and forge our way toward something new.

21:00 Leaving Language

When I say that we must leave language behind, I mean it quite literally. Language must be replaced, is in the process of being replaced, by a mélange of multimedia, of a chaotic mixture of text and symbols, audio and video, of words and images, topics and theses, concepts and criticisms, not neatly stacked into rows and distributed through an orderly process of content management, but blasted aimlessly into the environment, a wall of sound and sensation, not written but presented, not read but perceived.

The idea is as audacious as it is breathtaking. But it is happening today. You have probably heard of the concept of the digital immigrant and the digital native. The idea that the digital native, one who was born with today's electronic technology, one who got his or her first mobile phone before his or her first pencil (if they got a pencil at all), one who is part of, as some characterize it, the "MTV generation." The digital native, we are told, operates at "twitch speed," multitasks, and – quite literally – thinks not in an orderly progression of thought but in multiple parallel threads, associating seemingly at random, communicating not so much through sentences and paragraphs as through a barrage of images and (something like) text.

It is difficult for us to imagine – but think for a moment of the cave paintings found on aboriginal lands here in Australia and in similar dwellings around the world. Why didn't they just write on the wall, "Don't eat the yellow part?" It is, of course, to a significant degree because these cultures were pre-linguistic. If they had a language, it wasn't the sort of thing that was functionally useful, not the sort of thing they could scrawl on a wall. Written language was invented, and the complex structures and characteristics that followed invented as well, and it began from a sense-based, pictorial representation of the world. And if we think about how such people must have thought their thoughts, it must have been quite literally in pictures, the

linguistic capacity of speaking to oneself that cognitive theorists are so fond of talking about today either not used or not existing.

It is almost incomprehensible, but it is not beyond comprehension. We can, if we wish, learn to at least understand the language of the digital native, even if we are not able to speak it fluently. We can, as we understand the prehistoric, understand the future, by reading the artifacts. What unfolds is not only a new way of understanding the future, but a new way of understanding the world itself, and for us, as educators, a means of doing what we must, of preserving and propagating the knowledge and values of the past (and we have to do it right – we only get one chance).

24:00 The Blog

Our first artifact is the blog and the world of blogging.

Jorn Barger's original definition of a 'weblog' reads as follows:

"A weblog is a webpage where a weblogger 'logs' all the other webpages she finds interesting. The format is normally to add the newest entry at the top of the page, so that repeat visitors can catch up by simply reading down the page..."

The weblog format simmered for a few years, growing in popularity but escaping widespread notice until the arrival of a weblogging service called Blogger. Consisting of little more than a title field and a text field, Blogger was simple enough for everyone to use, free, and popular. Thus empowered, the format grew to the point where there are some four million blogs published today.

If the format is what defines a blog, the author is what defines blogging. The thing about personal publishing is that it is irreducibly personal. What makes blogging work is not only its simplicity but also its almost complete lack of restraint on the authors. Bloggers are variously wildly opinionated or incisive and informed, long and rambling or short to the point of beyond terse, left wing, right wing, anarchist, corporate, or even collective. Blogs are, if nothing else, the voices of the authors; any order beyond that is coincidence.

Blogs today are written in text, but as access improves and better tools are placed into people's hands, we will see more multimedia. Already there are audio blogs and photo blogs. And similarly, blogs are written on the computer today, but this too will change. Already people can send SMS messages or emails to their blogs. They can ring up a number on their mobile phone and dictate to their blogs. Any thought worth recording – and many that are not – are being stored in blogs, in whatever format is available at the time.

To the post-linguistic, each of these blog entries can be thought of as being like a word in the new language. They are the basic units of thought. They are reflective of a vocabulary that is rich and expressive, subtle and nuanced. They are not ordered in sentences but are strewn wildly across the internet; viewed in the aggregate, they appear random, like static, like noise.

To return to learning for just a moment, when we think of learning objects we should be thinking of two things: that learning objects ought most properly to be thought of as though they were blog posts, and that the primary authors (or speakers) of blog posts will be, must be, the bloggers themselves. We can, and should, join in the conversation. But we cannot control it. Learning objects may be constrained, learning design preordered, their authoring cumbersome and their distribution controlled. Blogs are the opposite of all this, and that's what makes them work.

27:00 RSS

If I am going to commit myself to the thesis that blog posts are like words in the new language, then it is reasonable to ask about the grammar of this new language. The answer to that question is, in my opinion, found in the underlying structure provided by a type of XML called RSS.

Rich Site Summary, or RSS, was a technology created by Netscape. The idea of RSS was that a content provider – such as a newspaper or magazine – could list the new items on its website in a machine readable XML format so that Netscape's own program could retrieve that listing – a process called 'harvesting' – and use it to design personalized pages on its NetCenter website. Users would create a NetCenter account, and then subscribe to those content providers they wished to read, and in so doing, design their own personal NetCenter page.

NetCenter did not, as Netscape had hoped, save the company, and they removed the NetCenter page, and even removed the RSS specification from its website. But by then a group of devotees – including myself – had taken hold of the idea, and RSS was reborn as an unsanctioned, unsponsored, unfunded and (for the most part) unused branch of XML, living on only in discussion lists that eventually became the 'Syndication' and 'RSS-Dev' groups at Yahoo Groups.

It was to this technology I referred explicitly when I wrote my paper 'Content Syndication and Online Learning', promoting the idea that RSS could be used to syndicate learning resources into an online learning environment. Based on this idea, I built such an environment in a site called MuniMall. Designed as a knowledge, learning and information resource for the municipal sector in Alberta, MuniMall was not a course, was not structured, was not ordered. It was – and is, since it is now an indispensable part of that community – an open-ended learning environment, and is probably more like the future of online learning than anything we'll see in a learning management system.

RSS is the semantic web. It is not the official semantic web – as I said, it is not sanctioned by any standards body or organization whatsoever. But RSS is what has emerged as the de facto description of online content, used by more than four million sites already worldwide, used to describe not only resources, but people, places, objects, calendar entries, and in my way of thinking, learning resources and learning objects.

What makes RSS work is that it approaches search a lot more like Google and a lot less like the Federated search described above. Metadata moves freely about the internet, is aggregated not by one but by many sources, is recombined, and fed forward. RSS is now used to describe the content of blogs, and when aggregated, is the combining of blog posts into new and novel forms. Sites like Technorati and Bloglines, Popdex and Blog Digger are just exploring this potential. RSS is the new syntax, and the people using it have found a voice.

30:00 Edu_RSS

With this in mind, my own work in recent years has involved the development of semantic networks within the blogging and RSS networks. More specifically, what this means is that I have been using the existing network in order to collect, organize, and redistribute information. In a certain sense, what I have been building is the equivalent of an airport hub or freeway interchange, a place where many strands of the network come together, are reorganized, and redistributed.

What I have built is a system called Edu_RSS, a software program that harvests the RSS feeds from two or three hundred educational technology blogs, stores the links in a searchable database, and then, sorts the links into topics and redistributes the results as a set of topic-specific RSS feeds. Thus, for example, I have on my website a page called 'learning objects' that represents, in real time, the collective contributions of several hundred authors, and yet is specific enough that it represents a very concentrated – and manageable – stream of information for the average reader.

Essentially, what Edu_RSS has become is a specialized content filter. It filters content in two ways. First, it filters content by selectivity. Out of the four million or so RSS feeds available, I have selected only a small number, only those relevant to my particular interests, from sources I think are reliable. Second, it filters by content. Each item is subjected to a semantical test – in my case, by matching it with a regular expression. Only items that match the expression are forwarded through the feed.

Edu_RSS also interprets data as it comes in. The world of RSS is unstructured – there are no fewer than nine types of RSS, numerous modifications and extensions, syntactic variations, and more. From this hodge-podge Edu_RSS extracts only the information it needs. If information is missing it supplies its own data. Part of Edu_RSS, a routine that analyzes mailing lists and creates specialized mailing list RSS feeds, actually constructs part of the RSS file by examining other data.

But for all that, the key to Edu_RSS is specialization. For all its power, it only tries to do this work for a small part of the internet. It is no Google; it is nothing more than a single node in a very complex network. What should happen, what is already happening, is that a large network of sites like Edu_RSS should emerge, forming in essence a second layer in the network. The result of this second layer is that the internet will self-organize, that information generated in a thousand or a million places will cluster, become composite, interpreted, specialized, and produce highly targeted, highly specific resource feeds at the output end.

Already the output feed for learning objects produced by Edu_RSS, even with a very incomplete input network, is probably the most authoritative news source in the world on the subject. No journal, no writer, no editor or formal publication, can match what Edu_RSS does, and yet it does it simply by drawing very naturally on the properties of the network. Academics, researchers and students who wish to keep up to date on the topic of learning objects turn to Edu_RSS first.

33:00 Order Out of Chaos

It should not be surprising that order emerges from a network of disorganized and disparate sources. Order emerges out of networks. This is how networks work, and that's why this is the grammar of the new language.

Order emerges out of networks because networks are not static and organized but instead are dynamic and growing. A network consists of a set of entities – called, variously, units or neurons, but which can be in fact anything from crickets to blog posts to bloggers. In a network, these

entities operate autonomously and are only tenuously connected – as the slogan goes, small pieces loosely joined. They receive input from other entities to which they are connected, organize that input, and then pass it on – or as the slogan goes, ‘aggregate, remix, repurpose, feed forward’.

As I said, networks are dynamic. Connections come, connections go. A connection may be used a lot, and grow stronger. It may be unused, and grow weaker. Connections form for a variety of reasons – one way, one of the simplest, is Canadian psychologist Donald Hebb’s principle of association. Two entities activated at the same time will tend to form connections with each other. Like attracts like. Clusters form, concepts emerge, and small worlds are created.

The type of network I described just now, the network of connected educational blogs created by Edu_RSS, is a type of network called a neural network. As the name suggests, it is a network designed to emulate thought processes. Whether the brain is itself a type of neural network remains subject to some debate, but as Edu_RSS illustrates, such a network can be developed to quite automatically obtain very specific results from very disorganized data. It is, quite literally, order out of chaos.

So where does this position us with respect to learning and learning objects?

The short answer is this: alongside Edu_RSS I have built a parallel system, the Distributed Learning Object Repository Network, or DLORN. It does exactly what Edu_RSS does, except that, instead of harvesting RSS feeds from educational technology blogs, it harvests learning object metadata from digital repositories. It is, in essence, an end-run around the federated search system, a way of collecting, recombining, and forwarding information about learning objects from a wide variety of sources.

DLORN is much less developed than Edu_RSS. Most information about learning objects is locked away. We need a blogger of learning objects, a simple and useful authoring system that lets staff, and eventually students, create their own learning resources to contribute to the common pool. And we need to rethink our definitions of learning objects, to move beyond static concepts, and to start thinking about learning objects as resources generally, not just textbooks and tests.

36:00 Learning Networks

The long answer involves rethinking what it is when we think about offering learning online. Instead of offering classes and courses, learning online ought to be structured along the model of environments, games or simulations. Writers like Seymour Papert and James Paul Gee talked about this, so I need not review their part of the argument. What I do offer to the discussion are the means and mechanisms for importing learning specifically into such environments.

Think of a learning environment as a space. If it is a space, then it can be thought of as a layer. It is, ultimately, the output layer of the learning network. Corresponding to points in this space, like stars in the sky, are the highly specific outputs of the learning network. Students are inhabitants who occupy this space. These outputs appear as features in their environment. Learning isn’t something they go to, something they ‘do’. Learning is simply ‘there’, a feature of the environment, to be used as needed.

Think further of the learning environment as a space, and it becomes clear that any space can become a learning environment. As access to the internet become ubiquitous, as our internet connection follows us, is available at home, in the community, on the job, it becomes clear that these output points may be located anywhere in the environment, whether that environment is Microsoft Word, a process control system, a grader or a fishing rod.

If, as I suggested above, we describe learning objects using the metaphor of language, text, sentences and books, then the metaphor to describe the learning network as I've just described it is the ecosystem, a collection of different entities related in a single environment that interact with each other in a complex network of affordances and dependencies, an environment where the individual entities are not joined or sequenced or packaged in any way, but rather, live, if you will, free, their nature defined as much by their interactions with each other as by any inherent property in themselves.

We don't present these learning objects, ordered, in a sequence, we present randomly, unordered. We don't present them in classrooms and schools, we present them to the environment, to where students find themselves, in their homes and in their workplaces. We don't present them at all, we contribute them to the conversation, we become part of the conversation. They are not just text and tests, they are ourselves, our blog posts, our publications and speeches, our thoughts in real-time conversation. Sigmund Freud leaning on the lamp post, just when we need him.

And if our words are worth hearing, they will become part of the common lingua franca, our culture and our knowledge, carried on in a new form through successive generations. We don't manage learning and control learning; we can't. We are but stewards.

39:00 Coda

You may not have seen some of the things I've talked about in this paper, things like learning objects, learning management systems, content packaging, federated search and learning design, but if you haven't, you will. Soon.

And you'll probably hear about them from a sales representative or network administrator or supervisor (if you hear from your students, it will be about blogs and RSS, iPods and online games, or if they're honest, file sharing networks).

And if the sales representative comes to you and tries to sell you an LMS or (worse) an LCMS, ask them why you have to pay them so much money for something the web and web browsers do for free.

If the sales representative tries to sell you online course and lessons, ask them whether it supports random access so students can use it when they want, even if they're not at school, or ask them where you can access the dynamic feed with daily updated content, or how easy it is to place images from the course content in your blog.

If the sales representative tries to sell you learning design, ask for the open ended improv version, the game outliner, the simulation editor. When he shows you the software, ask him where the student content goes in, ask him to show you the blog aggregator.

If you are asked to join a federated search network, ask the providers why are they afraid of the market place, what content are they keeping out, where the third party metadata is.

And when they speak of your students as human resources, knowledge workers, consumers or target markets, ask the sales representative if he remembers when he was a child, his mind a little network, small and fragile, but open and free, an ecosystem ready and wanting to support a jungle of diversity and growth.

Ask, above all, that our children be free.

Thank you.

About the Author



Stephen Downes

Stephen Downes is Senior Research Officer with the National Research Council of Canada in Moncton, New Brunswick. He works with the E-Learning Research group that is affiliated with the Council's Institute of Information Technology.

His principal work involves research and development in e-learning, working with institutions and companies to improve their competitive position in the industry, and outreach through seminars, workshops, and articles.

He designed and built a major internet resource called MuniMall for the University of Alberta, and taught philosophy by distance learning from Athabasca University. For additional information, consult <http://www.downes.ca/me/index.htm>. To receive his daily blogs about education and technology via email, subscribe to OLDaily at <http://www.downes.ca/cgi-bin/website/subscribe.cgi>.

Email: stephen@downes.ca

Editor's Note: This study interfaces social interaction and communication dynamics of interactive media across cultures and distance. It provides data for design of interactive learning environments to facilitate collaboration. It uses [ArchNet](#), an online community for architects, planners, urban designers, interior designers, landscape architects, and scholars. A workshop in architectural design links the School of Architecture at Massachusetts Institute of Technology with Miyagi University in Japan for this study.

Communication Dynamics in Technological Mediated Learning Environments

Federico Casalegno and Irene McAra Mc William¹

Abstract

In the following paper we discuss communication dynamics and those interactive media characterizing remote collaboration. We analyze results of ethnographic research carried out during a collaborative design workshop between the Massachusetts Institute of Technology, School of Architecture and Planning, and the Miyagi University, Japan.

We focus on the social interaction and communication dynamics of interactive media that emerged during this workshop in order to understand and design learning environments for remote collaboration.

Keywords

Remote collaboration, learning environments, interactive media, social interaction, information, communication, cyberspace.

Introduction

The challenge of communication technologies is not only to transmit *pure information* but, above all, to enable a *real communication* between people and communities. The transmission of information is certainly important, but it is far from sufficient. Real, effective interpersonal communication is, first of all, based upon the exchange of different kinds of messages, postures, gestures and intonations that physical co-presence can transmit. It is also important to focus on the fact that communication follows different rhythms of interaction. During the same interaction, interlocutors exchange messages with strategic information and *structured data*, but at the same time they also exchange *free content* messages, that are extremely important for the interaction and the relationship between them (*phatic communication*, as we will see later).

1 Federico Casalegno, Ph.D., is research affiliate at the MIT – Media Lab, Smart City group, Cambridge, USA.

Email: federico@media.mit.edu, Web: <http://www.media.mit.edu/~federico>

Irene McAra Mc William is Professor of Interaction Design and Head of the department Computer Related Design, Royal College of Art, London:

Email: irene.mcwilliam@rca.ac.uk, Web: http://www.rca.ac.uk/pages/research/professor_irene_mcaramcwilliam_606.html

Second, the context gives us very important information; when people travel from one place to another on the planet, for example, the context helps us to spot the differences between cultures, behaviors and environments. Moreover, in physical places, information from the environment where the interaction takes place, play a fundamental role in the communication. At the same time, situations and people transmit relevant information: how we should behave, and which cultural paradigms and social customs are in play.

In cyberspace everything has to be constructed. One of the most important issues concerning the cultural architecture of the cyberspace is the construction of these cross-cultural points that characterize these new spaces for interaction. In physical spaces, rich context is already present and we become part of that context. In electronic travels these dynamics are much more complicated.

In this article we emphasize that the content of communication is based upon the synergy between the information and the context in which information is produced and received: this is the challenge that new media environment design has to face.

The other powerful notion that we wish to emphasize is that effective communication does not take place until people create a shared knowledge and a common context of interaction: without this mutual agreed context, a space of shared values and a communal memory, there is no effective communication between people and communities.

Remote Collaborative Workshop: Description

During the *Computational Design for Housing* remote collaboration workshop², two universities, the MIT School of Architecture and Planning, USA, and the Miyagi University of Japan, were involved in a jointed design project. The workshop focused on design computation and remote learning collaboration to create a design project. The objective was to develop a small housing project using shape computation as a design methodology³; the students used and tested new interactive software in order to design, to share applications with overseas partners, to present their projects on an Internet workspace, and to criticize design proposals through the web and other advanced digital communication technologies.

After an introductory lecture, the students worked on design proposals directly in their classrooms, and in accord with the collaboration model used during this workshop, they were divided into four teams; each team was made up of two MIT students and two Miyagi students. The students had to design a group of 24 townhouses in a specified site, each design project had to be close to reality and the houses could be displayed in smaller rows or clusters, but they had to be subdivided into smaller groups (each team could decide how many houses they wanted for their clusters). Although the programs for MIT and Miyagi students were similar, units area and the sites were completely different: one was tight and the other one was almost too large. The students regularly uploaded their work into the class web-site⁴, *Archnet*, and worked together on the design proposals. During classroom work, they accessed remote collaborative software to discuss their proposals with their overseas team members. During different stages of the designing process, the students consulted their partners, finalized and criticized each other's design proposals. Each group took advantage of the opportunity of on-line consulting to outline

2 For further information visit the class web site: <http://www.mit.edu/~4.184/> All URL's quoted in this article have been checked on October 20th, 2004

3 On this point see : <http://www.shapegrammar.org>

4 <http://www.archnet.org>

cultural characteristics of the American and Japanese society, lifestyle and houses (like the cultural conception of houses and families, spaces and relationships between family members, social hierarchies, dimensions of houses, number of bathrooms in each unit, where and if they could place the laundry and so on).

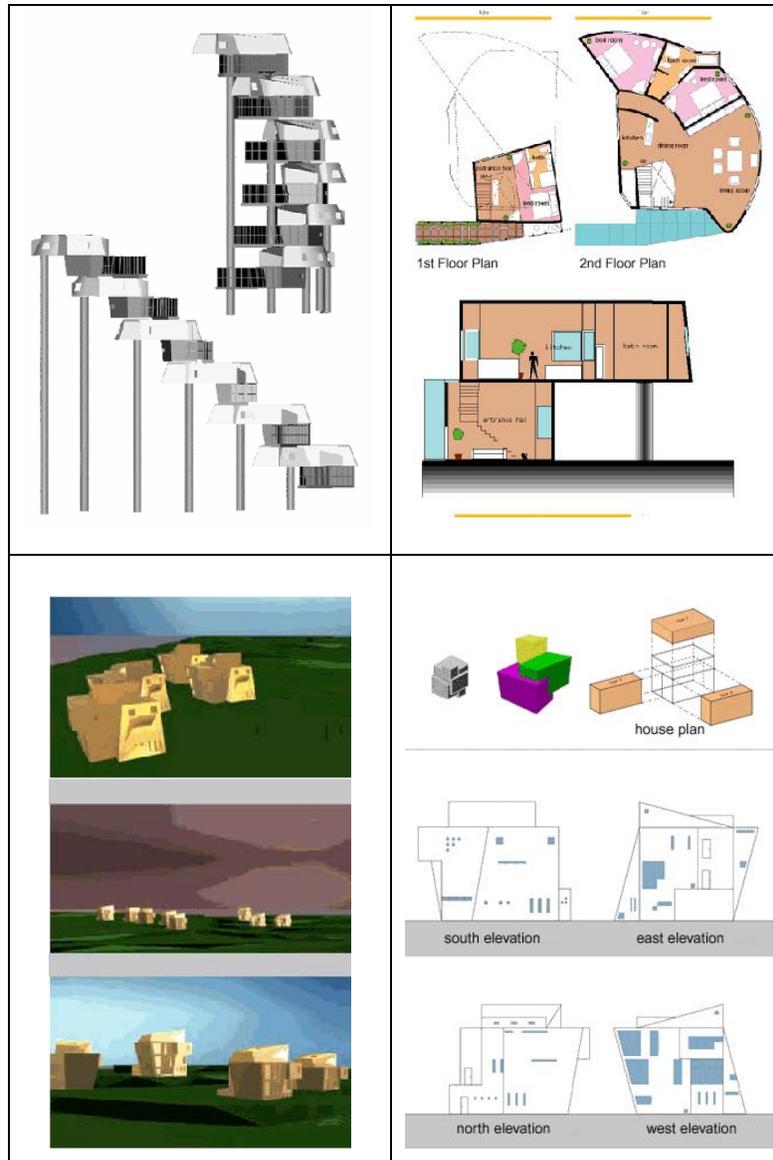


Fig. 1 – Two examples of final design projects

To achieve these goals, communication dynamics were based upon a variety of complex tools that included email, chat, a specific web-site, NetMeeting⁵ and Picturatel for videoconferences. Through the methodical and simultaneous use of these interactive tools, a new communication and learning environment was established that allowed the students to successfully carry out their design project.

5 <http://www.videofrog.com/>

Part I: Communication Dynamics in Remote Collaboration Environments

1. Experience / Intimacy

In a workshop where communication technologies were used in order to establish relationships between people in far off places and distant cultures, socialization dynamics are very important. I will first examine the gap between the intimacy of those relationships growing between the individual participants and the experience of people when socializing during the online communication process.

During the workshop, the participants found themselves in close and sudden intimacy with people living very far from them and with a very different cultural background. Thanks to the video, audio, and to real time communication, the participants established a strong and familiar relationship in a very short time with people they didn't know, creating a sort of mechanical intimacy yet without having deeply experienced this intimacy (G. Simmel, 1996). In this case we are dealing with an *a-synchronicity*, a sort of time lag between the results of the communication process and the individual experience.

At least in a short-term workshop, communication technologies do not allow students to clearly state the deepness of the relationships they establish with the others. One develops close relationships with strangers, yet without having experienced this intimacy: if new media can accelerate the feeling of intimacy, that does not mean that people actually experience it.

Edward T. Hall (1966) insisted on the importance of the physical distance between actors during the interaction, and the consequences that this element plays in the construction of a shared knowledge. He points out four principal distances regarding human relationship: intimate, personal, social and public. His research shows how distance can be crucial in the communication between people: these distances are the achievements of an harmonious balance between people and cultures, constant adjustments that not only concern the social environments and the cultural context in which communication takes place, but also the tone of the voice, the volume, the intonation and all those relevant information that Hall identifies with *sensorial information*. The tools for remote collaboration modify this balance and pave the way for new ways of communicating; however the students interviewed during the workshop felt a disparity between the great space distances and the intimacy of their relationship.

2. Flows and Rhythms

Intersubjective interactions follow certain communication flows and rhythms that are fundamental for the positive outcome of communication between individuals and/or groups. Whether they are perceptible or not, and even if it is not easy to spot them, we cannot deny these flows exist.

Within the workshop a new communication environment was established and, as Michael Heim points out (2000), in order to understand social dynamics within these new environments we have to shift from the "user tool model to the content delivery model". From a methodological point of view, in a word, we have to shift from studying the substances' and objects' properties to the field of energies in which the *substances* are interacting. To understand the interactive context the users are experiencing, the interaction flows in which they are evolving, the "user tool model" in which we try to understand the bi-directional relationship between subject and communication tools, between action and immediate and direct result, turns out to be obsolete.

"The distinction of "user" and "user's tools" opens a split between subject and object, user and field of use. To study flow, the basic dichotomy of frontal subject staring at target object must be undercut by the ontology of worlds. The new way of looking is similar to the way in which scientists after Newton revised their approach to studying physical phenomena. Newtonian physicists could not see what we today call fluid dynamics and turbulence theory. It just did not appear on their "radar screens." (Radar deals with energy fields.) For scientists to visualize and study fields of flow, there had to be an ontological shift. Traditional science, still influenced by Aristotle, focused mainly on substances or on the properties of substantial entities. The new sciences, on the contrary, turned attention from substantial entities toward fields of energy in which substances relate to one another. Theories of relationships and configurations took precedence over theories of substantial entities. The ontological paradigm of physical science had to shift so that new phenomena could come to the fore. The study of flow in virtual environments must likewise turn attention from the user-tools model or the content-delivery model and focus on the interactive context in which the user is immersed" (Heim, 2000).

Bearing in mind that the synergic use of different media leads to a new communication environment, it is important to understand the different contexts in which relationships take place, rather than understanding the immediate and direct effects of interactions in far off and interconnected places and in which different groups of people follow complex schemes and ways to interact. If we go back to Heim's hypothesis, and if we do not follow a frontal approach, we should focus on the communication flows in which interactions take place within a definite interactive context, rather than focusing on features of these communication tools.



Fig. 2. Students socializing using NetMeeting.

3. "Phatic" Communication

In the act of communication we can identify both multiple factors and different functions. Within these functions it is certainly relevant to consider what Malinowski (1923) defined, in 1923, *phatic communion*. He refers to an aspect of communication whose function is to create ties between the people engaged in the communication thanks to the mere exchange of words: communion, precisely, as Malinowski points out, with the function of *joining together, put together connecting*. Phatic communion is an important element of the speech that aims at opening and keeping communication channels open, in order to maintain relationships between interlocutors fluent without necessarily transmitting "precise" or "functional" information.

Starting with this concept, in 1960, Roman Jakobson proposed a communication model in which he develops the phatic function: "There are messages primarily serving to establish, to prolong, or to discontinue communication, to check whether the channel works ("hello, do you hear me?"), to attract the attention of the interlocutor or to confirm his continued attention ("Are you listening?" or in Shakespearean diction "Lend me your ears!" - and on the other end the wire "Um-hum!") (1960, p. 355, see also Fiske, 1990, p. 35).

Phatic communication refers also to trivial and obvious exchanges about the weather and time, made up of readymade sentences or foreseeable statements. These are redundant phrases which, as it happens in the mythic narration, must not persuade with a logic argumentation but only emphatically seduce the actors. Michel Maffesoli (1993) underlines the tactile function of communication (*tactile*, to touch) to focus on the fact that during a social interaction we can have moments in which what is important is to metaphorically “touch” the other rather than transmitting or exchanging information. Therefore this is a type of communication that establishes a contact without transmitting a precise content, where the *container* is more important than the *content*.

Starting with this assumption, we can remark how within every communication dynamics we have at least three main moments; an opening, a medial and a closing one. If during the medial phase the content exchange takes place, that is the *strategic oriented information*; in the opening and closing moments the users shift from a non-interaction moment to an interaction moment, or from an interaction moment to a farewell. Phatic communication refers to these transitional, marginal moments in which the users make conventional, stereotyped and trivial conversation that is essential to establish a certain harmony and good communication dynamics between them. In the opening phase phatic communication is important as it allows the users to find a common language, to spot a common semantic field and to establish a psychological feeling and a certain hierarchy among them. During the closing phase the users consolidate their relationship and its new nature, confirm their agreements or what they discussed in the medial phase, seal their agreement or disagreement and set the parameters for any eventual future exchange.

Thus, the media environment used in a remote collaboration must in a sense foresee or take into consideration this function of communication: if these dynamics are missing, the interaction is affected and no longer effective.

Considering these assumptions, new communication technologies are challenging us with the following paradox: technologies, and the rapid advancements characterizing them, transmit progressively better visual information, images, voices, animations and sound, but that is not why they allow for better communication among people and communities. It is not true that there is always a correspondence between technological achievements and an improvement in the communication process. Networked technologies allowing a transmission of information are fundamental, but without a true and deep understanding of communication dynamics the collaboration and the social exchange weaken. Phatic communication, as well as the other forms of body language or communication with a low information content, are crucial because they create the contact between people, opening the way to communication and collaboration. Without this “communicational cycle” between people and groups, communication does not take place, and messages are imprisoned within the addressers, provoking what Jean Baudrillard would define, the impossible exchange (2001).

We can therefore have a phatic communication being *content* free in opposition to the formal communication being *content* rich.

These types of communication, obviously, are not mutually exclusive: they enrich and complete each other. Sometimes, during the remote collaborative workshop, the tools were difficult to use and this phatic communication went wrong (the participants criticized it because, for instance, with NetMeeting sometimes it was difficult for them to speak to their partners because interruptions were too frequent and they spent more time asking if they could hear each other than actually communicating). One of the most frequent concerns was non reliability of the interactive tools the students used, the lack of continuity in the communication flows, which did not allow the users to exchange the ritual phrases that lead to good communication with their partners. Lacking this ability to relate to the remote partner, interaction became more difficult, especially

for the following phase of communication where students exchanged practical and project-related information.

From this perspective, in designing remote collaborative environments, it is important to consider the different functions of social exchange which characterize the communication process: those interactions which are not directly “work oriented”, for instance, can make the encounter between partners easier and consequently make the realization of the projects easier, facilitating the “task oriented” communication. It is very important to consider that phatic communication, which is *content* free, and the formal communication, which is *content* rich, are complementary.

4. Rhythming the Media

One of the students said that “For us, there was the sharing of the program to see what we would be talking about. We had talking, very practical start with NetMeeting, then we would share the program to show to our partners what we had done the day before... but it would move into chatting, because sometimes talking was inaudible, they didn't understand. By the end of the class we would concentrate on chatting, we could share out ideas through chatting... there's a good level of socialisation ... e-mail happened after -- it was very formal, almost like a letter.

Chatting is short answers, very direct... e-mail was more formal -- we even used different vocabularies. I think they could communicate ... their e-mail was amazing, they weren't nervous about talking... they were able to think about what they would write. I got e-mails from people even after the class”.

Participants in this workshop were accustomed to use different communication tools (particularly chat, web and emails): nevertheless, for some of them it was the first time with videoconferences and NetMeeting. Secondly the students were not accustomed to using web site, chats or email within a defined and targeted project such as within the collaborative design workshop.

Therefore we have to consider that in order to use new interactive media in a creative way it is not enough to simply “use” new tools, but we have to change our behavior and habits while communicating, and that is of course something very difficult to do. We are facing new socializing processes with media and if we use old strategies we can waste their richness. In that sense, new languages are to be explored: for example, cinematographic language is different from the poetic one, even if they both allow us to express the same emotion. In the same way, the new media have a lot of potentialities but they require the learning and the use of new languages and mental processes. Helping the participants to discover how and why they had to use a particular tool could actually make communication easier: establishing a sort of rhythm with the tools they were using, knowingly articulating email, chat, web, videoconference and silent moments, allowed the participants to feel comfortable, to create and find new ways of communication.

In short, students involved in these workshops need more information on how to use the different communication channel even if they are already accustomed to the media they are using. The participants we interviewed during the workshop, for example, believed that teachers had to tell them “which tools they should use and why, making communication more discrete and pushing the students to use the right communication tool for the appropriate purpose”, as one of them said.

When cooking one has to choose the right ingredients and use them at the right moment, because every ingredient has its own function; when designing communication environments with different media, one should choose a communication tool according to their needs and the appropriate goals in order to use it in the most efficient way. And this doesn't mean the necessity to impose an universal model, but this underline the importance of having a dynamic appropriate to the particular situation and context, following the notion of emergent design (D.Cavallo, 1996).

On the other hand, the tools used are still not “perfect” and it is easy to get tired of them and abandon them before managing to enjoy their advantages. As it happens with everything that is new, if the users begin to use NetMeeting and they cannot connect properly, then it will be easier for them to choose another tool that they can use better and whose features they know better. Therefore, they can shift from media to media hoping to solve the technical or communication problems, even if they actually do not solve the problem at all.

That is why when designing a remote collaborative workshop it is important to link the media to the required action, creating thus a more explicit relationship between technology and finality. In this sense the importance of establishing certain rhythms in communication, which otherwise remains fragmentary, emerges.

We can better understand this issue if we consider that during the workshop the participants used communication tools in a different way from what they normally did; the participants’ habits were modified within a very short time. Moreover, if the participants did not persevere and changed tools too often, they did not allow themselves the necessary time to learn how to use new technologies. In this sense, when designing collaborative environment it is important to pay attention to the information dynamics clearly pointing out the aims that people need to reach when using different communication tools.

Still, as for the difficulty in “getting to know” their partner, it is important to create occasions for meeting and preliminary exchanges at the beginning of the workshop. For instance, one could send short curricula and self-introductions with pictures before starting, allowing the teams more time to chat together with the sole purpose of getting to know each other and to relate to the others. Or, it could be possible to send a personal introduction to the others via audio file or to find new creative solutions.

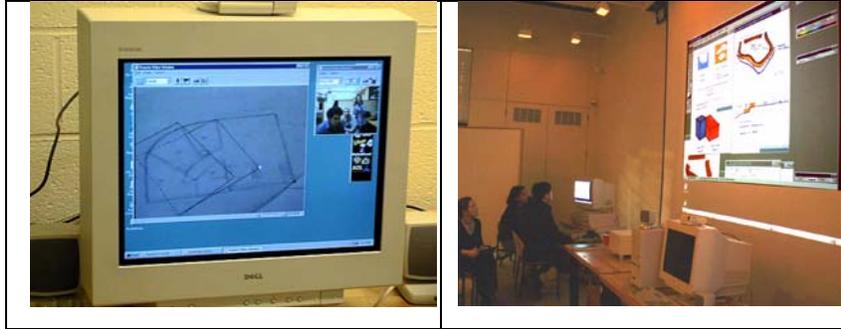
There are many alternatives, and William J. Mitchell (1999) himself emphasizes how important it is to establish a sense of identity and of belonging to a community, putting the participants in the condition of giving and not only receiving information. That is why for instance, the fact of sending out pictures before the workshop or creating audio files, having pictures with names, helps creating this community feeling within students.

Bearing these considerations in mind, it would seem that creating a continuous and harmonious communication flow is crucial for the positive result of the interaction. It is extremely important to find those mechanisms that allow participants not to have to socialize and get to know each other each time they connect.

According to this, how can we design a coherent communication process respecting a continuum flow of information?

During each session, participants socialized before starting to discuss the contents of the project (the communication flow could also be interrupted due to technical problems, given that the workshop took place over several days, or different tasks during the class). Therefore it is important to search for new ways to make communication as uniform as possible, giving the process and the course itself a sort of sequence in spite of discontinuity.

One solution found during the MIT-Miyagi workshop was that of giving out photocopies with the pictures and the names of the partners. Being able to see the participants’ pictures with their names on them made it easier to associate faces and names to the people you were interacting with, and it established an effect of memory which linked the days and the lessons with people and interactions. Being able to remember the person you were talking to, their face and their personality, was very important as it designed a dynamics which simplified interactions throughout length of the project.



**Fig. 3. A shared workspace between MIT and Miyagi.
On the right is the final presentation of the design project**

5. Mediation and Relative Advantages

A reality is never given, but is a mutual construction between society and social actors (Berger and Lukmann, 1967). However, one of the most dangerous assumptions is to consider that there is *one reality*; on the contrary what exists is a reciprocal construction of common sense and shared knowledge (see also Watzlawick, 1976). Communication flows and rhythms are important for this reciprocal everyday invention of meaning and construction of common reality. New media spaces should reproduce the condition that helps the actors in this enterprise of mutual construction of a shared meaning and a common knowledge.

We should take into consideration that every communication system has features that enhance certain elements of interpersonal communication presenting advantages or disadvantages.

Therefore, we can emphasize that "face to face" interaction, in real time, with video images and audio messages, cannot be considered the best by far. Chat and emails for example, allow the users to develop their imagination if they do not see their partner: they have the opportunity of imagining their correspondent, favoring imagination in dialogues and exchanges or giving more freedom to the message issuer that remains anonymous. Voice or video image, giving more images of the person who is releasing information, can limit freedom and imagination that email allows by transmitting less information.

One of the students, referring to the quality of communication system and, especially, to what helped him to communicate ideas with overseas teammate, said:

“Archnet, the ability to share the software, and being able to talk to the Japanese partners, anything that allowed us to show them what we were doing, but as long as we were able to show them a picture of what we had, we didn't have to see them, as long as we were able to share what we were looking at, like in autocad. Even if we didn't hear the voice, a lot of times it was more efficient to chat -- we were able to understand that better. Seeing them on a TV screen is a whole lot different to seeing them face to face. it's just different. with TV, it's difficult to see them as real”.

In this sense, we must consider that **media work as mediators** between people or groups. The interaction at the simultaneous presence of the users and in real time, has its undoubted advantages, yet, provoking a collapse of time and ways of mediation is not in itself the best way in most effective interpersonal exchanges. To this degree, it is interesting to determine the positive aspects of all media, accentuating or diminishing their mediator role, and to apply them to the communication dynamics you intend to favor. Another student said:

“I think we used NetMeeting more when we were talking about the programs, when we were using them, we tended to ask any of the real information after the class by e-mail -- that was the only way we got any information which helped the project.”

6. Ambient / Context

It is no doubt true that interaction spaces and networked communication environments are progressively evolving together as they are gradually defining themselves. Such environments are being constantly experimented. Information tools lead us to very interesting issues especially for designers and communication experts, leading us to think over new learning environments, new cooperative spaces and new processes in managing knowledge. In fact, the schools so far have been always designed according to the communication tools that were disposable in that particular time, within a precise historical and scientific frame (Meyrowitz, 1985).

But how will "the classroom of the future" be? Will we still have it? How will it be from an architectural and structural point of view given that we will still be referring to it as a classroom? How should this environment be structured according to the available communication tools and to the social interaction coming from it? In fact, it would be misleading to maintain that communication, during a remote collaborative workshop, takes place in the ether and in the cyberspace. On the contrary, communication takes place within interaction flows and environments; environments and flows influence and determine each other. The interaction between people who are physically present and people who are present thanks to remote communication tools creates a completely new and unrevealed communicational environment⁶.

If we analyze Picture Tel and videoconference, we notice that these systems establish a contact between our environment and the external one. During the interaction we receive and send out visual messages concerning the environment: for example, visual information coming from Miyagi told us about the school structure, social arrangement, the relationships between people, all of which clearly have a strong impact on people's communication. A quoted example is the feeling of cohesion that Japanese participants transmitted to MIT students when they laugh all together at the jokes of their teacher.



Fig. 4. Jokes at the Miyagi University.

One of the students affirmed that "The Miyagi students couldn't see us altogether, we were spread out at different stations, so if I was a Miyagi student I would think "these people don't cooperate with each other" [...] On the other side, their professor would make a comment in Japanese, and everyone would laugh at the same time. There was more of a community there -- I tried to get in the camera [...] even our teaching assistant said you should gather around me so that they can see that there are people here..."

We can also observe that at the Miyagi university the students were all sitting frontally and always in the same place, while MIT students were always changing places. During the

⁶ I've defined this emerging environment as *Communicational Climax*, Casalegno, Federico, 2000.

workshop, MIT students were allowed to eat and drink (they worked from 7 pm to 10 pm): if this can be seen in the US as a way of establishing an informal and relaxed atmosphere, it is in contrast with the Japanese teammates, who think it is inappropriate to eat at their workplace, and it marked the cultural and behavioural differences between the two groups. In this sense we are facing the emerging of new communicational environment.



Fig. 5. Miyagi students frontally seated; MIT students and Prof. Mitchell in a circle table.

Moreover, MIT students were always changing classroom (they worked in two different classrooms alternatively), while the Japanese partners worked in the same classroom throughout the workshop. Continuously changing classrooms could represent a logistic difficulty for teachers and instructors, and the students seemed disoriented by this constant change. In fact it seems that students prefer to work always in the same classroom; MIT students think that their partners, being always in the same room, develop a cohesion and consistency feeling, a sort of feeling of continuity that leads to feeling part of a community. One could argue that during a brief workshop, staying in the same room can make it easier for the students to get to know each other, to identify and recognize themselves and make communication more immediate. To this degree people tend to link the place to the chance of establishing strong relationships between the students. Being such a fast course, we get the impression that the participants' faces (therefore the relevance of pictures with names) and places contribute to this feeling of knowing the others and of belonging to a community.

Without dwelling upon this issue any further and considering this point with a critical distance, it is no doubt clear how these kinds of information determine communication forms and vice versa.

Another element brought up by the students was trying to find ways of interaction that provide moments in which people are and must "be together", in a collaborative situation, and times in which they need some privacy to exchange ideas and opinions with their local partner, a *silent moment*, disconnected from remote collaboration tools. For instance, they need to discuss "privately" some issues so they can agree and give a common response to their overseas teammate. In this context, the students' exposure to cameras should be regulated so that a balance between "private and public moments" can be set. Being able to give a rhythm to the media also means to find moments of being exposed to communication technologies and moments of silence.

7. Consistency

We can consider that thanks to videoconferences or NetMeeting, it is possible to establish a visual connection through spaces which reflects into a whole new and yet much more complex communicational environment.

This important element leads us to consider that sharing a visual space and the opportunity of listening and seeing remote partners give the shared environment a certain consistency. Thanks to the fact that the students are able to see each other, they feel that they are sharing the same physical and social environment. This feeling is also due to the fact that they are actually sharing the same semantic and learning environment; being able to listen and to see each other, conveys the feeling of sharing the same place and allows the students to realize that they are actually simultaneously at the presence of another group of students. This is a very interesting element and it does not only concern the lessons or the moments in which people actually speak and communicate ("active" moments of communication). This also concerns the visual aspect that permanent interconnection allows. As well as the musical background, visual connection create a certain atmosphere that is important even in those times when people are not actively interacting with each other (*silent moments* of communication).



Fig 6. Left, Prof. Nakata and G. Celani on NetMeeting; Right, Prof. Mitchell

Another consideration is that, within an indefinite environment in which interaction spaces open up assuming new configurations, it is important to set new parameters that identifies interaction perimeters. For example Heim's research (Heim, 2000) concerns the behavior of Avatars in three-dimension virtual architectures show us how some virtual worlds have never become effective learning places because their architectures were too open and boundless. On the contrary, if virtual architectures and environments within limited spaces are created, giving internauts points of reference, that allows avatars to feel a sense of position, to find their way and thus exploiting fully the communication processes. Creating the right intimacy between people and architectures (virtual and/or real) allows us to create environments that can favor social communication and learning processes. These considerations have to be kept in mind while designing remote collaborative workspace.

Part II: Contextualized Information

1. Universal with Tonality

W. Benjamin, in the essay "*The work of art in the age of mechanical reproduction*" (Benjamin, 1985) shifts our attention towards the ways of reproducing and transmitting the "aura" which characterizes the artwork and that mechanical transmission cannot communicate. A picture has a value as far as it gives us the artist's vision and, secondly, as it is linked to a certain place. Therefore we cannot separate the artwork from the environment around it. After photography was discovered and thus the opportunity of reproducing infinite times a piece of work, the tie between the authenticity of the picture and the wholeness of its message has been broken.

How can the *hic et nunc* be transmitted, how can the aura which makes every artwork unique be communicated? How can this feeling of uniqueness which is consumed in the moment and that gives communication an intangible density be reproduced?

We have pointed out how new technologies despite making distance short, cannot replace experience. In the same way, during communication processes, it is not about transmitting messages, but transmitting a sort of "*here and now*", transmitting the information with the intensity and meanings it has, creating thus a unity of time and place, leading to what the workshops' participants called "*common commonality of where you are*".

W. Benjamin relates an artwork aura (in our collaborative workshop we could talk about communication or social interaction) to the feeling of uniqueness, authenticity, tradition and custom that the artwork itself releases and in which it is imbued. The aura that cannot be reproduced mechanically is defined as a singular (original) piece of time and place. The paroxysm of the development of new communication technologies leads us to consider two key factors. First of all, as we are facing simultaneously a time lag and an expansion in accessing information on the spot and on a world scale, there is the constant need to contextualize this information within a "*here and now*". Edgar Morin (Morin, 1999) indicates the capacity to contextualize information as one of the seven fundamentals of knowledge for the future education. In the second place, if the binary information can be transmitted easily leading technology to the highest degree of expression, then there is a growing necessity of transmitting what Benjamin defines as "aura" and that refers to the synergy of feeling the moment and tradition, the immaterial, the intangible and everything that cannot be reduced to the binary transmission.

With the evolution of the media, the relationship between messages and context, people and places radically change. We find ourselves in a particular environment where the one who produces messages does it within a particular context, in a given culture, in a specific time and place and one must recreate this context so that those who receive these data are able to understand them properly. To better understand this point, we can point to Pierre Lévy's "*universal without totality*" concept, as the core value of the emerging essence of cyberculture (Lévy 2002, 1994)⁷, and think of media ecology and the transition of oral cultures to written cultures.

According to Pierre Lévy, in oral societies linguistic messages were always received at the time and place they were issued. The issuer and the receiver shared an identical location and, most of

7 For all the analysis on *universal without totality* I refer to P. Lévy, "Dialogo con Pierre Lévy. La memoria, un processo in essere nel presente", in F. Casalegno, "Memoria Quotidiana. Comunità e comunicazione nell'era delle reti", Le Vespe Editore, Milano, 2002. <http://www.memoire-vivante.org>. See also Seely Brown & Duguid, 2000.

the time, the same universe of meaning. The communication actors were immersed in the same semantic bath, in the same context, in the same flow of living interaction.

Writing opened a space for communication unknown to oral societies, in which it became possible to learn of messages produced by people located thousands of kilometers away, or dead for many centuries, or expressed by foreign cultures or different social contexts. As that moment, the actors in communication no longer necessarily shared the same situation; they were no longer in direct interaction.

It is difficult to understand a message outside of the living context in which it is produced. This is why, on the receiving end, arts were invented for interpretation, for translation, an entire linguistic technology (grammar rules and dictionaries). On the issuing end, messages were composed in such a way as to make them likely to circulate everywhere, independent of the conditions of their production, and carrying within themselves the keys to their interpretation or "purpose". This fabrication of out-of-context messages became the nucleus for a certain rationality and eventually led to the notion of universality. The idea of the universal corresponds to this practical effort at communicating out of a specific context, an effort that only makes sense where writing is concerned, argues Lévy.

In the universal founded by writing, interpretation, translation, diffusion, conservation must preserve the meaning. The meaning of the message must be the same, here and there, yesterday and today. This universal is inseparable from an effort to determine semantic limits. This impulse at totalizing works against the open plurality of the contexts where messages circulate, against the diversity of communities that circulate them.

“The major cultural event heralded by the emergence of cyberspace is the shift between universality and totality, these two social operators or abstract machines (much more than concepts!) called universality and totalization.

The cause is simple: cyberspace dissolves the pragmatic aspect of communication that, since the invention of writing, joined the universal with totality. It brings us back to a pre-literate situation - on another scale and in another orbit - where the partners in communication, the interconnection and the dynamism of on-line memories in real time renews the sharing of context, of the same, huge, living hypertext. Whatever the message, it is connected to other messages, other comments. In short, cyberculture is giving form to a new kind of universal, the universal without totality” (Lévy, 2002, p. 282).

What the new media drastically miss, and the real challenge in designing remote collaborative environments, both in technical terms and for communication dynamics, is exactly the possibility of transmitting the new content of the information, that is crystallized in the harmony between the information with the context. Communication is not only strategic and planned, formal or structured information, but it is also tactile and informal, visual and emphatic. In the contextualized information, new interactive media must help to interlace disseminated information and enrich them with the *aura*, within the social and cultural context. The next step to design communicational environment and interactive media environments should focus on the Universal with Tonality: the ability to share information with the *universal* message is certainly important, but this information has to accompany the *tonality*, referring to all kinds of information communicated that are less visible and perceptible, but that complete the communication and make it effective and meaningful. With this notion of tonality we include also cultural references, ritual, and the various inclinations and nuances that each society attributes to a different concept. The *tonality* is the information combined with the flavor, and the semantic and conceptual intensity that gives sense to it.

2. Communal Memory

In trying to allow groups of people living in far off places to interact with each other, to communicate and to become a real team, it is essential to create a feeling of shared memory for the emerging community. Every community needs to share a common memory; this is also true for those communities which rapidly grow and fade away like the ones that characterize remote collaborative workshops. Memory is not only useful for reminding participants who their partners are, thus creating a continuum and making communication easier, but it also allows us to create a sense of a common culture, a common ground which makes cooperation really effective. These strategies allow the participants to create a common memory and therefore favor the positive outcome of the projects. However, this common memory, to go back to Michel de Certeau (1988), more than "recording" is "answering"; in fact, he emphasizes that memory lives and is effective when people take possession of it, when they are able to manipulate and modify it, when it is *"regulated by alteration"*, that is being able to manipulate and modify this memory. Memory exist only through this constant and permanent modification on the users' behalf; it does not have a fixed and static shape, but it gains power because it may be altered and modified.

In this sense, when students have to upload the web site, putting pictures of the on-going projects or criticizing them with their teammate, we face a process of appropriation; as we mentioned, a common memory is established when you have the opportunity to change and enrich collective data, to *regulate by alteration* rather than consulting merely the information or access databanks. So being able to appropriate the cyberspace or customize the web site by uploading images, exchanging projects or sharing works, allows the students to reinforce their cohesion and feeling of belonging to a community. As one of the students said about the web-site:

"...It was very useful. I think I went into ArchNet more than I used e-mail. I would jot [comments] down during the class and put comments on their work after the class. It was good, I really likes it apart from the the fact that I couldn't contain much other things -- the images were very small when they were pinned up... I think the images were too small, it doesn't really inspire people to click on it. It was different from pinup in reality, each of them was so small, it takes time to click on each one. Uploading was great, posting was a great idea... small details... when I go to my workspace, I always had to change it to 'show the works in five days'!... I wanted to see the process of my work ... "

The screenshot shows the ArchNet GROUP WORKSPACE interface. The sidebar on the left contains navigation links: LOBBY & NEWS, MY WORKSPACE, GROUP WORKSPACE (highlighted), NEW GROUP SPACE, DIGITAL CALENDAR, DIGITAL LIBRARY, DISCUSSION FORUM, MEMBER PROFILES, INSTITUTIONS, CAREERS, COURSE SYLLABI, SEARCH, HELP, and LOG OUT. The main content area is titled 'GROUP WORKSPACE' and 'Federico Casalegno'. It features a section for 'MiyagiMIT Workshop Spring 2001 (Archived)' with a 'What's new in the last 5 days' update section. Below this, there is a description of the workshop and a list of group administration notes and subgroups.

The screenshot shows the ArchNet website interface. At the top left is the ArchNet logo. Below it is a navigation menu with options like 'LOBBY & NEWS', 'MY WORKSPACE', 'GROUP WORKSPACE', etc. The main content area is titled 'LOBBY & NEWS'. It includes a welcome message, a login form with fields for 'Email' (containing 'casalegno@mit.edu') and 'Password', and a 'LOG IN' button. Below the login form, there are statistics: 'Images 37'037', 'Publications 2'154', and 'Members 19'745'. A section titled 'Congregational Mosques in Eastern China' features five small images of different mosques. Below the images, there is a paragraph of text explaining the historical significance of these mosques.

Fig .7. Archnet website www.archnet.org

On this point, Martin Heidegger (1955) reminds us that “*the feeling of living in a place*”, in its full and original meaning, becomes true in the act of building. Building has the objective of letting us inhabit a place, making us belong to that place, developing a sense of belonging. If this is true for physical space, it’s also true for the architecture of cyberspace.

Building, for Heidegger, not only is a means for inhabiting, but in itself is already a phenomenon of inhabiting. Showing how the verb “to be” and “to live” in German, have the same root (*bauen, buan, beo*), he shows how “to be” and “to live” share the same value. In these terms building is a form of inhabiting itself; the archnet website, allowing customization, allows this highly meaningful experience for people in general and for the students. Building becomes a form of experimenting and appropriating a place. Building means living, giving sense and meaning to space, through building people experience the feeling of taking possession of the space.

Secondly, Seymour Papert’s notion of *contructionism* (Papert, 1992) emphasizes the importance of externalized, socially sharable entities, artifacts or objects in the learning process. Learning process is based on the internalization of the external information and by the externalization of internal information, in a cyclic perpetual shape.

Bearing this conceptual framework in mind, any process allowing the students to create their own space, to manipulate and customize it, increases their sense of belonging to a community.

Moreover, sharing memories helps to the creation of the context: during the communication process, one of the first phases is to establish a body of common knowledge on which people agree, and this allows social actors to communicate. This is part of the difference between working in a web environment and working with videoconferencing. With video people find themselves in a situation of synchronous interaction yet they develop very little shared memory, shared context. If, on the contrary, we consider the work in a web space, the interactions make up a sort of history, what people do becomes part of the context, exchanges crystallize communal memory. This is one of the reasons why asynchronous communication is so effective and functional. Everybody can refer to this memory, to this common shared knowledge, built together and meaningful for the community.

Conclusions

The development of new media and the progressive spreading of the emerging and rapidly growing phenomenon of remote collaboration paved the way for interesting research in several fields, from teaching to communication, from design to architecture, from ergonomics to studying interfaces. Remote collaborative environments represent a very good opportunity to design communication spaces that allow for social interaction between people and between distant communities, supporting different forms of communication, work and creativity in various domains. Furthermore, technological progress makes interactive media progressively more efficient, easier to use and destined to a wider public. Nevertheless, mankind has been communicating for thousands of years: each social interaction is based on a variety of common languages and on the sedimentation of culture, complex rituals and social habits. If interactive media and collaborative environment match these dynamics, they can be very helpful, but if they impose new behavior without considering the complexity of human communication, they lose their powerful and richness. New technologies, to be effective, must take into consideration the users, and place people at the center of the universe that new media create; *new* technologies must learn from *old* social dynamics to be effective.

Rather than drawing premature conclusions on this emerging phenomenon, this paper intends to frame some questions about communication dynamics in remote collaborative workshop and learning environment.

Our analysis of collaborative environments focused on two major areas; communicational rhythms and information context.

The word context comes from the Latin, *contextum*, meaning to “weave together,” to “connect together,” to “interlace with,” and referred to information it gives us the idea that information can’t be understood if isolated from the whole context, which includes the environment, the culture, the rituals and the social habits.

Secondly, the richness of communication is based not only on the exchange of information but also on the density of these exchanges. We can have an effective communication only if we consider the multiple elements characterizing the complexity of social interaction, and this is why we support the ***universal with tonality*** hypothesis. The double challenge for the interactive media aimed at designing remote collaborative spaces is that they have to help actors to share information with *universal* meaning, as well as include all the others aspects that make communication effective, the *tonality* of the information.

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About the Authors

Federico Casalegno

Federico Casalegno, Ph.D., is a social scientist with interest on the impact of networked digital technologies in human behavior and societies. He carries out advanced research on new media environments, wireless networked media and connected communities.

His latest work has been with the MIT Media Lab with the Smart City Group rethinking the "car of the future" and the evolution of the relationship between the physical environment, human relationships and the space of electronic information.

He works on the implementation of multimedia educational technologies for innovative learning environments and he has been doing research related to remote collaboration, distant learning and collective shared knowledge in networked media environments.

He holds a Ph.D. in Sociology of Culture and Communication from the Sorbonne University, with a focus on mediated communication and social interaction in networked communities and wired cities. He worked on the connected community "Living Memory" project.

Web: <http://www.media.mit.edu/~federico> email: federico@media.mit.edu

Irene McAra-McWilliam

Prof. Irene McAra-McWilliam is head of the Interaction Design department, Royal College of Art, London.

She has an MA in Psychology and carried out research into biotechnology at the University of Aberdeen. McAra-McWilliam's research interests include the psychology of technology and cultural change, the relationship between design, cultural research and science, and the inclusion of indigenous and cultural knowledge in the design of technologies.

As Director of Design Research and Development at Philips Electronics in the Netherlands, McAra-McWilliam steered the research in interaction design and experience design.

Since 1994, McAra-McWilliam has been an advisor to the European Commission, coordinating the research theme, 'Connected Community', within the long-term research domain of 'Intelligent Information Interfaces'. Within this programme she envisaged the award-winning project Living Memory: a project that allows informal exchange of information and the sharing of experience between people in a local community.

Web: http://www.rca.ac.uk/pages/research/professor_irene_mcaramcwilliam_606.html

Email: irene.mcwilliam@rca.ac.uk

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Editor's Note: Geographic Positioning Systems (GPS) and digital maps provide a rich resource for development of learning objects. The e-MapScholar learning resource developed a content management system that allows instructors to customize learning objects, tools, and content (including DigiMaps and digital geo-spatial data) to their own needs. An online questionnaire and two-focus groups identified needs and anticipated benefits for higher education and further education. A funded study grant resolved many of the initial questions and provided a functional resource enter to support additional studies.

The Uptake of Learning Object Based Online Resources: Lessons from e-MapScholar

Sarah Cornelius

Abstract

Research on learning objects has to date focused principally on technical aspects of learning object development and re-use. Less work has been published on the implementation and application of learning object based resources in learning and teaching situations. This paper attempts to address this gap in the literature and examine some of the implications of learning objects for teachers. It considers the 'context of use' of online learning and teaching resources developed for the e-MapScholar project. These resources were developed to support learners using digital geo-spatial data from the UKs EDINA Digimap service.

This paper introduces the customizable learning tools that were designed using a learning object approach for the e-MapScholar project. It outlines and reviews research that has been undertaken with the potential user community to explore the 'context of use' of these resources. Users' views of the need for the resources, the benefits of using them and their applicability to learners are examined. Many of the issues discussed, including the continued existence of the 'not invented here' syndrome, customization, personalization and implementation are likely to arise in other development projects and are explored in depth.

Keywords: learning objects, online learning, context of use, customization, personalization, implementation, Digimap, e-MapScholar

Introduction

Learning objects (LOs) have been the focus of extensive discussion in the literature over the last few years (e.g. Wiley, 2002). Much of the focus of research and development work has been on the technology used to describe and share learning objects (Rehak and Mason, 2003). However, resources for learning and teaching, based on an object approach, are now becoming available to users. Examples include the UK's NLN (www.nln.ac.uk) and JORUM (www.jorum.ac.uk) and Canada's EduSource (McGreal et al., 2004).

Rehak and Mason (2003) suggest that users should not have to worry about learning object technology, as their objectives are teaching and learning. However, there are some issues that they may need to address. These include customization, quality, digital rights, implementation in the local technical environment and relevance to the intended learners. These issues constitute the 'context of use' of the resources.

This paper focuses on the user and potential use of LO based resources. It explores issues raised by research undertaken with potential users of a Learning Resources Centre and Content Management System created as part of the e-MapScholar project. Following a brief introduction to the project and the products themselves, the paper describes the research project and outlines the findings. The implications for the development and implementation of online learning resources are discussed and areas for further work are highlighted.

e-MapScholar and e-MapScholar2

The e-MapScholar project was funded under the JISC Learning and Teaching (5/99) Programme (www.jisc.ac.uk) to provide customizable learning materials to enhance and support the use of geo-spatial data (including data from the EDINA Digimap service) in UK tertiary education. EDINA Digimap is a computer-based service that delivers Ordnance Survey (OS) digital map data and high quality cartographic products across the Internet via a simple to use interface (Morris et al. 2000). Digimap has been providing digital map data to Higher Education in the UK since January 2000 and was expanded to include Further Education in 2001 (Massey and Medyckyj-Scott, 2002)

Evaluations have revealed that Digimap encouraged the use of OS data in teaching and learning and promoted the use of digital data in disciplines outside the traditional 'map domains' of geography and cartography. Over 80% of users are non-geographers and 50% are undergraduates (Massey, 2003).

Given this broad user base and the growing use of spatial data in the real world, for example in real time location based services and Internet mapping, an understanding of spatial data is increasingly part of the skill set of the well-educated graduate. The e-MapScholar project aimed to support learning in this area, as well as the needs of teaching staff to provide new, exciting and interactive learning materials using geo-spatial data. The project has tried to provide materials that encourage the development of a greater understanding of geo-spatial data to allow users to go beyond simple online presentation of maps to more sophisticated data manipulation and analysis tasks.

e-MapScholar produced three learning and teaching resources:

1. A series of teaching case studies.
2. Customizable learning tools providing learning resources and map manipulation functions that can be used to promote awareness of digital map data
3. 'Virtual placements' to provide students with experience of the application of OS data in the workplace.

This paper considers the customizable learning tools. Further information about the case studies and placements can be found on the e-MapScholar web site at <http://edina.ac.uk/projects/emapscholar>.

Customizable learning tools and resources

The design of the customizable learning tools was informed by requirements analysis (e-MapScholar, 2003) which revealed that tutors required:

1. learning objects with embedded interactive tools rather than learning materials and separate tools,

2. a core set of quality assured learning resources that could be customized and reused, and
3. ability to localize the content of the interactive tools to their specific geographic context.

As a consequence, and with JISC agreement, the e-MapScholar team designed and developed an online Learning Resource Centre (LRC) and online learning Content Management System (CMS) to manage the new resources and allow tutors to customize content and tools to their own needs. The focus of the CMS is on customization as it permits adaptation of existing content for reuse in the LRC. The design is based on a learning object model (Rehak and Mason, 2003; Wiley 2002; LOM, 2000) with each element (graphic, text, tool or assessment) created as an independent object and combined to create pages, units and resources.

The model is illustrated in Figure 1.

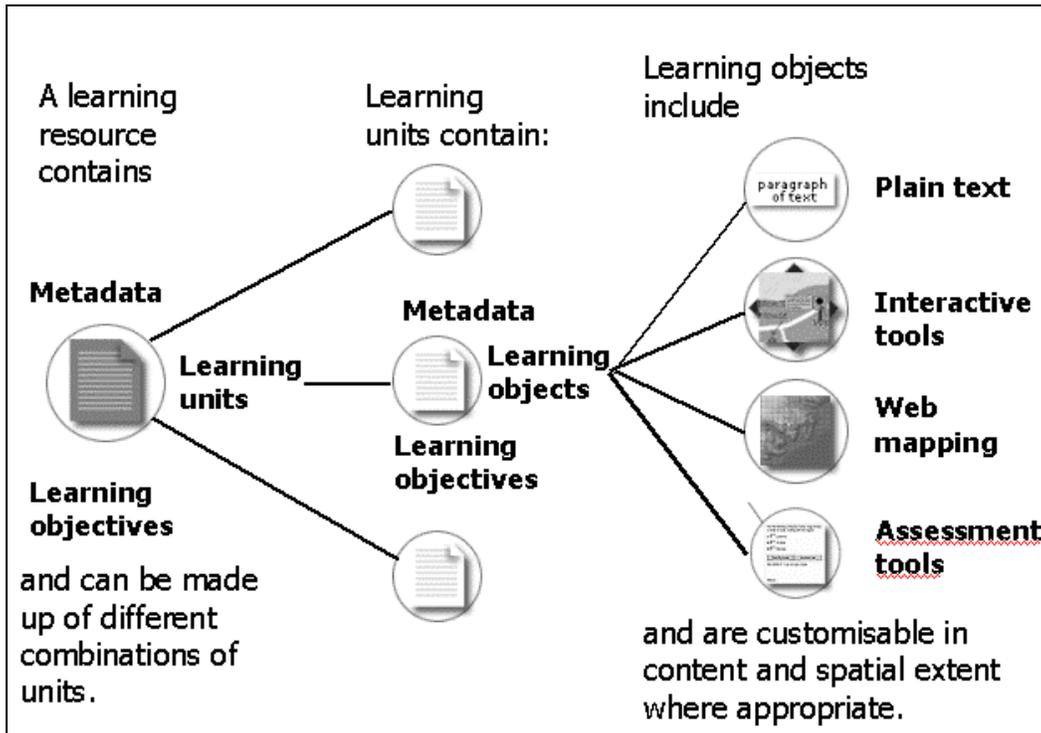


Figure 1: Components of an e-MapScholar learning resource (after Purves et al. 2002)

Initial resources cover three topic areas:

1. Working with digital map data
2. Data integration
3. Data visualization

An example of a typical page illustrating the key components of the materials is shown in Figure 2.

e-MapScholar Unit Title: Scale
 Page: 2 of 10 Help | Print this page
 Navigation tools Back to Resource prev | next

What is scale?

A map, like a photograph, must be smaller than the land it portrays. Map scales tell us how much smaller.

More formally, any map scale is the ratio representing the relationship between a specified distance on a map and the actual distance on the ground. Map scales are any ratio of a distance on the map to the actual distance on the ground.

Text object provides context and concepts

... using a verbal statement. For example, the scale of a map can be described as so many inches to the mile: the old Ordnance Survey 1:63 360 map is often referred to as the one inch to one mile map. The words explain the distance on the map that represents a certain distance on the ground.

There is nothing unusual in the idea of scale: we apply it every day, instinctively, without even thinking about it.

Measurement tool allows interaction with real time map

Kirkby Mallory

Coordinates: 446644 mE, 301059 mN
 Distance: 1335.6 m
 Bearing: 69°17'27.465" (DMS)

Assessment object provides immediate feedback

Q. What is the distance between the two Public Houses (PH) or pubs??

1 5 km

2 The two pubs are approximately 1.45 km apart

3 1.9 km

Reveal Answer Give Me A Clue

Figure 2: Student view of a typical page from the LRC

An important feature of the resources is the use of specially developed tools that allow interaction with spatial data provided live from the Digimap service. These tools permit operations such as zooming in and out, measurement of lengths, changing of colours and contouring. They are generic so that they can be used in different learning materials. Learning resources also contain self-assessment exercises for the learner to test their own learning and a glossary of commonly used words and phrases is provided. Students are invited to submit comments and feedback on the learning units using online forms.

The design of the learning materials using the learning object approach makes customization and re-use possible. Other features, such as the provision of metadata with learning units, also facilitate the production of customizable paths through the units. Customization is undertaken using the Content Management System (CMS). The CMS allows customization of existing learning units and creation of completely new content for the Learning Resources Centre (figures 3 and 4).

A framework for usability evaluation of the e-MapScholar products, and the results of this evaluation are presented elsewhere (Blake et al. 2003; Jones et al. 2004). This paper focuses on the context of use of the products.

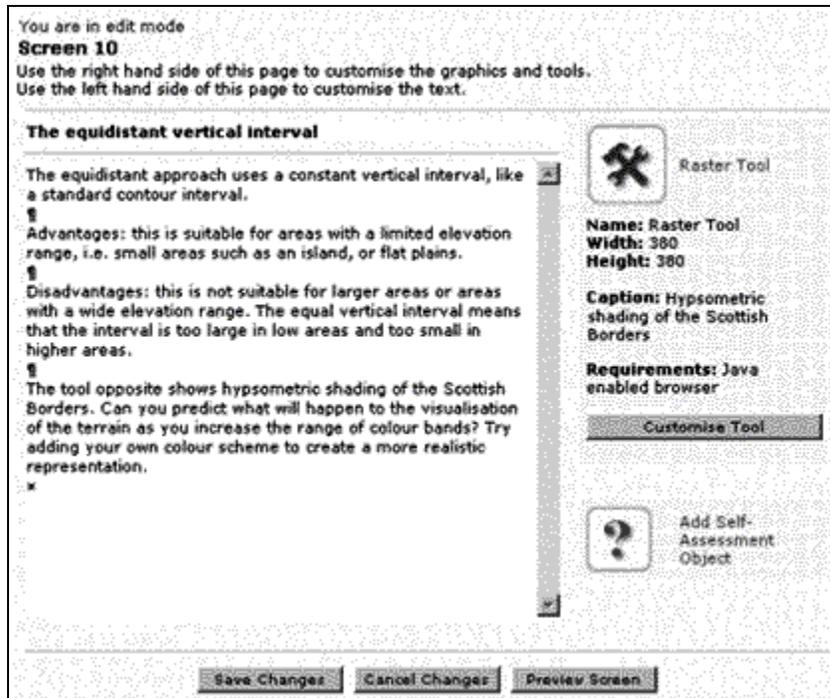


Figure 3: Screenshot from CMS showing features available for customization of text, tools, graphics and self assessment objects

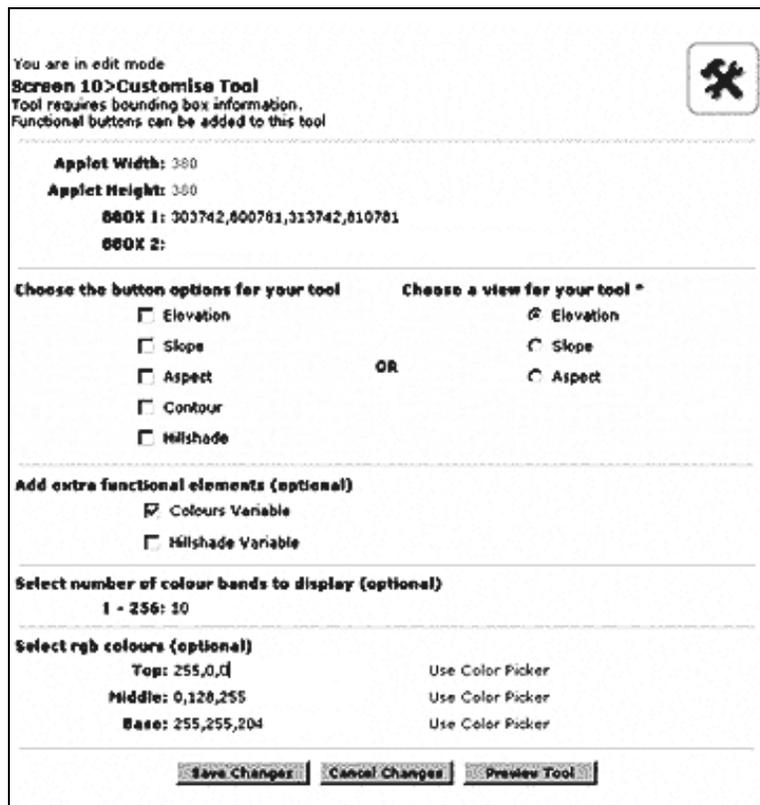


Figure 4: CMS - a simple 'tick box' form allowing customization of a tool that displays data using different slope, aspect, contouring and hillshading options.

Context of use study

The context of use study was undertaken as part of a larger evaluation project (e-MapScholar2) to assess the need for and viability of services for learning and teaching based on the e-MapScholar products. The aims included:

- To understand the impact that e-MapScholar products may have on teaching and learning
- To evaluate the potential areas of use of the products within the HE/FE community
- To assess the demand for the e-MapScholar products
- To identify needs for customization of products and additional tools, data and content
- To assess the need for other versions of e-MapScholar LRC/CMS, including a more generic product
- To evaluate practical implementation and uptake issues such as support needs and management of content
- To suggest possible strategies for engaging and supporting new and existing users of the products.

Methodology

Data collection for the context of use study followed a multi-method design. Several methods of data collection were employed, and no one method determined the use of another. The aim throughout was to gather information from a wide range of potential stakeholders across the Higher and Further Education communities, and to include the views of Digimap users as well as those who are not currently users of digital geo-spatial data.

The survey methodology was adapted from the successful JORUM+ User Requirements Study (JORUM, 2004). Methods used to gather data were an online questionnaire, focus groups with HE and FE staff, telephone interviews and face-to-face interviews with key informants. Data from a separate user evaluation of the content management system, undertaken independently by the Open University (Davis, 2004), was also considered.

Using these data gathering techniques research aimed to address questions such as:

1. What are the potential areas of use of the products within the HE/FE community?
2. What needs do the teaching staff have within these potential areas of use?
3. How would the e-MapScholar products be used?
4. What customization of learning resources is needed?
5. What interactive tools are needed within the LRC/CMS?
6. What is the demand for each product within potential areas of use?
7. Would the provision of an e-MapScholar service impact positively on teaching and learning?
8. Would lecturers be prepared to allow re-use of materials they create within the CMS by other lecturers?
9. Would staff customize existing materials in order to create new versions for their own needs?

10. Would staff be prepared to create and submit new materials to the CMS?

11. What would encourage the community to participate actively?

Initially an online questionnaire survey was conducted and promoted to all existing and potential Digimap users via mail-lists and web sites. The aims of the questionnaire survey were to get a wide range of evaluations of the market need and potential use of e-MapScholar products; to identify participants for telephone interviews and focus groups and to provide specific evidence of need and use issues. Respondents to an online questionnaire are self-selecting in nature, and by their nature likely to be involved with e-learning. However, the methodology adopted was considered appropriate given the time and resources available to the study.

The survey response rate cannot be ascertained due to the method of distribution used. Although total numbers of subscribers are available for many of the mail lists used, it is impossible to ascertain how many of these members are active, and how many subscribe to more than one of the lists used. However, it is hoped that anyone with an interest in e-MapScholar has been given the opportunity to contribute (see figure 5).

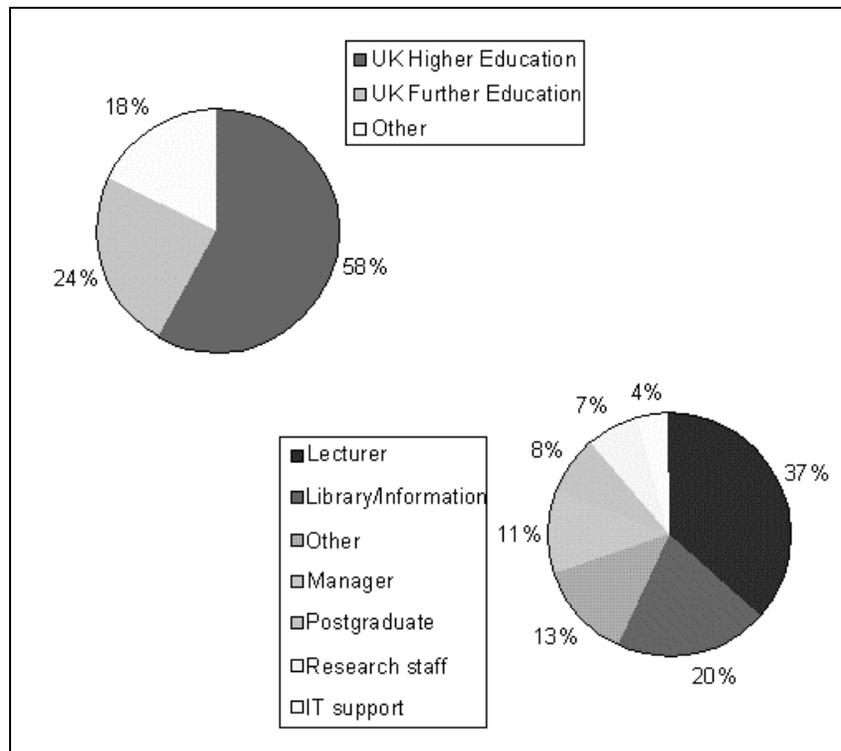


Figure 5: Summary of online questionnaire respondents (n = 89)

Two focus groups were conducted to explore issues related to implementation issues and potential use of the products raised by the questionnaire responses. The aims of these focus groups, and of interviews were to provide information from experts and potential users to validate questionnaire findings and to identify and explore other relevant issues not raised by the survey.

More general issues of the impact of online resources on teaching and learning were also explored with 5 key informants drawn from a range of disciplines including textiles, management studies, education and geography. Taken together the results provide a useful picture of issues that affect the adoption and use of customizable learning resources. These issues are explored further below.

Adoption and Use of Customizable Learning Resources

Recognising the value

Over 80% of lecturers and 75% of all respondents to the online questionnaire expressed a need for the Learning Resource Centre (LRC). The need for the LRC is less clear in Further Education (FE) than Higher Education (HE), but overall 59% of lecturers would consider using the LRC in their own teaching.

Sixty three percent of lecturers expressed a need for the Content Management System (CMS). Again this need was higher in HE (59%) than FE (45%).

The uses and benefits that the products were perceived to offer were many and varied. Table 1 summarizes the main categories of benefits identified.

Table 1:
Expected benefits and applicability of e-MapScholar products

Learning Resource Centre	Content Management System
<p><i>Expected Benefits</i></p> <ul style="list-style-type: none"> - Reinforcement of learning and access to additional materials to support learning - Improved quality of learning experience - Time savings for tutors - Improved access to map data - Students interacting with materials - Staff exposure to new ideas, organizations and materials 	<p><i>Expected Benefits</i></p> <ul style="list-style-type: none"> - A better learning experience - Access to more resources and sharing of resources - Increased efficiency and time savings - Feedback on my own work and sharing of ideas
<p><i>Applicability</i></p> <ul style="list-style-type: none"> - At all levels from A-level to continuing professional development 	<p><i>Applicability</i></p> <ul style="list-style-type: none"> - from A-level to postgraduate

Despite the use of online videos, web site and printed materials, the best way for respondents to fully understand the e-MapScholar products was through hands on experience and demonstrations. Without opportunities to develop a full understanding of the products many respondents found it difficult to comment on the value of the products to their own work.

The 'not invented here' syndrome.

Despite evidence of enthusiasm for the products, further exploration of potential use revealed that issues of ownership and identity, and the 'not invented here' syndrome were important to many teachers.

The ‘not invented here’ syndrome as a constraint on CAL potential was evident well before the 1990’s. However, most products at that time, including those developed by the GeographyCal project (Healey et al., 1996), were not customizable. Some of the other cultural constraints on developing and using computer assisted learning listed by Healey et al. (1996) were reluctance to try new methods of teaching, the low priority given to teaching and learning, and fear of technology. These did not appear to be issues amongst the respondents in the context of use research.

The use of an object based approach to development has been advocated as a way to overcome the ‘not invented here’ syndrome (e.g. Duncan, 1996), but clearly the situation is not straightforward, or anywhere near resolved in the minds of tutors and teachers. Still prevalent within the survey respondents was a reliance on in-house developed materials and a reluctance to use materials from elsewhere. Some of the reasons cited for this were the need for a sense of ownership of the materials and for the materials to fit in with the teaching philosophy and style of the lecturer. Learning resources also need to integrate with any Virtual Learning Environment (VLE) in use in an institution. Although ‘out of the box’ use of products may be possible in some situations (e.g. within FE or as additional resources for first year undergraduates), for higher levels or on specialist courses it is unlikely.

Joint et al. (2001) review the literature on courseware for academic library user education. They identify several factors that can be emphasized to encourage adoption. These include a practitioner sense of ownership of the courseware medium and materials and tailoring to a local information environment rather than generic solutions. These echo the ownership and customization issues that have been raised by the e-MapScholar research, and customization is discussed further below.

Customization

There is consistent evidence that where educational software has not been produced by the academic who is using it, the ability to customize it for use in their own context is important (Jones et al., 2004). Amongst lecturers there was evidence of interest in customization (63%) and there was evidence from focus groups and interviews to support a higher level of interest in customization amongst those who were particularly familiar with the e-MapScholar products and their features. However, many respondents (57%) did not know whether they would wish to customize resources.

Survey respondents suggested some potential applications for customization:

- to allow the resources to fit in with the broader course structure
- to set specific questions based on particular research areas
- to conform to local configurations and practice (e.g. within a Virtual Learning Environment)
- to link to personally developed resources
- to create exercises and examples based on an area the students are familiar with
- to translate the materials into another language.

They also identified issues such as security, quality control, copyright, ownership and time which would need to be addressed to encourage customization and sharing of resources. Tutors were generally enthusiastic about the idea of customising, seeing it as a way to provide the sense of ownership needed to get past the ‘not invented here’ syndrome, but they worried that the time required to customize might be a major issue. They wanted to be able to customize the resources

so that they have a look and feel to match other course resources, although a direct link to a resource (or preferably unit or even page) would be acceptable in most cases.

Some of these issues echo those from elsewhere. For example Jones et al. (2004) report evidence from the SoURCE project that in order to customize what was intended to be re-usable software, academic staff needed further support and often underestimated the time that the process would take (Beetham, Taylor and Twining, 2001).

Evidence of reluctance to customize also comes from Collis et al. (2001). Evaluating TeleTOP, a system that allowed instructors to determine before or during a course which of thirty features and tools they wanted for their course environment, they found that many instructors did not make use of the tailoring options.

Lecturers would need to be taught how to customize the resources using the Content Management System, and some of respondents felt that it was complex. However, with a closer look using demonstrations and hands-on experience others found that it was easy. Clear instructions, training and simple customization options (e.g. changing all the data in a resource to the tutor's local area) would assist new and intending users of the CMS.

Offering opportunities for customization and publication of new and edited resources is all very well, but a culture that promotes sharing of resources needs to be in place for this to be successful. In some cases teachers indicated that they might share, in some they may need an incentive, and in others they would not share at all. Culture varies from place to place and discipline to discipline. For example in subject areas where there are relatively small numbers of academic staff (e.g. agriculture), most know each other individually and this facilitates sharing. Other examples suggest that sharing of resources in a larger community can also be successful (e.g. HE Academy Centre for Bioscience share resources, images and other educational items). Tools within the CMS may help with this by tracking the 'authorship' of a resource and units.

Some tutors and teachers indicated that organizational policy regarding copyright would impact their ability to share, and that decisions would be taken at a higher level. One possible incentive for sharing would be to enable tutors to use submissions for teaching portfolios and CPD purposes. Chitwood et al. (2002), reporting on the Wisconsin OnLine Resource Centre Learning Objects projects which involved the collation of objects from authors in 16 different colleges, found no easy answer to copyright issues. They intended their objects to be free at the point of use, and believed that their objects should be copyrighted to protect them. However, the ownership of this copyright has become a difficult issue to resolve as each of the 16 colleges involved in the project has different intellectual property language. The only potential solution is to ensure that all staff involved understand up front who owns the copyright. This is an aspect that will need to be made clear to anyone who intends to customize or publish new information using the CMS.

Rehak and Mason (2003) suggest that the users of a learning object must determine quality, as metadata does not provide the necessary information to allow comparison of different LOs. They advocate a 'recommender' system such as that found at Amazon.com. The JORUM project is implementing annotation fields to allow teaching staff to comment on resources (Massey, 2004). This is a feature that could also be developed for e-MapScholar.

Personalization

The nature of learners in tertiary education has changed over the past few years. During the context of use study opinions such as 'there is no such thing as a full time student anymore' were voiced. Tutors are conscious of the need to meet the needs of students who have part time jobs, who study from home and the workplace as well as their hall of residence, and those who have

differential access to computing resources. They are also aware of deficiencies in IT and other skills necessary for successful self-directed study using online resources. Examples were cited of first year students with no prior experience of computing; fundamental deficiencies in areas of IT expertise such as the manipulation of windows and file management; and a lack of time management skills. Added to these problems is a lack of understanding about how students actually use these products. Respondents often suggested that embedding use of the resources within an assessment strategy would be the only way to ensure that they were actually used by students.

At the same time there is evidence that learning is becoming more student centred. Students are being asked to reflect on their own learning, for example in the development of Personal Development Plans. Stephenson (2001) suggests that we are set to witness a major switch in emphasis from the selection, processing and packaging of content by the teacher to the selection, processing and adaptation of materials by the learner. Downes (2004) also recognises that systems will emerge that allow students to be designers. This switch was hinted at by some of the focus group participants and interview respondents. They made suggestions for ways in which it students could customize the resources including:

- changing displayed maps to reflect the learner's home town or study area
- adding data from their own field studies to a base map.

Customization by learners in this way may help to contextualize resources, facilitating in turn ideas of situated learning. McAvinia (2002) suggests that different subjects have different cultures and these need to be taken into account to contextualize the learning experience for students. This is an important issue for e-MapScholar where potential users are drawn from so many different subject areas. In the resources developed by McAvinia for key skills development customization allowed different departments to prioritize different skills and to allow students to take particular routes through the resources (McAvinia, 2002). Perhaps a combination of tutor and student customization is a possible route forward for e-MapScholar too.

Tailoring learning to individual contexts is also advocated by Rehak and Mason (2003), and the learning object approach, with its ability to meet learners' demands for learning that is timely, personalized and targeted, is offered as a mechanism for this. Although this might suggest that going back to a 'home produced' strategy might work in many instances we should also remember that learners' expectations of educational materials are derived from non-educational settings and will, quite rightly be high (Jones et al., 2004). Perhaps this is where the CMS and LRC could score highly with learners - the framework is a high quality collection of professionally presented objects which can be customized to meet many of the identified user needs.

Implementation

To date only the LRC is available to registered Digimap users. However respondents addressed issues of implementation associated with the LRC and CMS.

Issues of time and support were important considerations in preparing resources for use in teaching and learning. Just over one third of respondents would wish to access e-MapScholar from within another system (e.g. VLE). Where a particular VLE was noted, these were split evenly between WebCT and Blackboard. Moves to standardization using VLEs are important drivers in many institutions. As these are intended to provide a consistent 'student experience' it would be an advantage for learning resources to be able to fit in with these.

The hosting of the e-MapScholar products on a central external server was preferred by potential users. As technical issues of security are becoming more complex, respondents felt that central

units best dealt these with. The current system of authentication using Athens was accepted as necessary, but potential users would prefer to be able to provide seamless access to products through VLE or course web site without the need for additional logins and passwords.

The current model of support is also acceptable. This consists of local support through site representatives together with backup from EDINA staff. Mail lists are also available to users for peer support.

Other expected implementation difficulties included:

- Inflexible course structures
- Lack of knowledge of the products
- Time
- Ownership issues and resistance to change.

Course structures and validation processes were highlighted as an important issue affecting the implementation and uptake of online resources. This is not usually a problem if a product is going to be used as a very minor part of a course module, but developing a whole module around a product would normally need to go through bureaucratic procedures that could take anywhere between 18 months and 3 years. As a result there was a call for products to be stable and available long term to facilitate their integration into existing courses.

Hodkins (2002) considers that the success of learning objects will depend on the 'masses' being able to put them to use quickly and easily. He also states that there is a critical need for raising awareness, education, and dissemination of information about the tools and technology. This is reflected in the results of the e-MapScholar work - 45% of FE staff did not know if they would use the LRC in their own teaching - a figure that is probably influenced by a lack of knowledge of the features and benefits of the LRC. Potential users suggested that uptake would be facilitated by the use of tutorials, workshops and personal demonstrations backed up by examples of best practice and use. The use of onsite staff with an understanding of the local context is also recommended for training.

Conclusions

The context of user study found considerable enthusiasm for the learning object based products developed by e-MapScholar. Some of the issues raised by the study have relevance to other development projects.

Collis et al. (2001) suggest that instructors will use new tools if they perceive their 'educational relevance and management feasibility'. Many of the benefits of using e-MapScholar products were recognised by survey respondents so, if relevance and feasibility can be promoted to a wider audience, the uptake of e-MapScholar products could be significant. However, there are some issues that do need to be addressed to facilitate this uptake.

Any new product is unlikely to be used if potential users are unaware of its existence, so dissemination and promotion should be an integral part of development. But perhaps more importantly, in a culture where much dissemination of good practice is by word of mouth, potential users need to be made aware of the educational benefits that the products offer, and the types of situations in which they can be employed. The use of case studies, exemplars of good practice and other 'sustained initiatives' will be important to stimulate creative teaching and learning (Collis and Moonen, 2001).

Customization needs to be an essential component of any externally produced teaching and learning resources to overcome the still prevalent 'not invented here syndrome' and promote a sense of ownership and identity. The value of customization or personalization directly by the learner should also be considered to promote motivation and self-directed learning.

Finally, implementation issues, such as long term procedures for the integration of new learning resources into the curriculum, institutional policies on copyright and uptake of VLEs will all influence developments. Products need to be stable over a relatively long time frame - a feature that is seemingly at odds with rapid technological and pedagogical developments in online learning. Funding programmes that offer start up opportunities will facilitate the development of skills in product development, but will not secure longer-term use and adoption of the products.

The e-MapScholar learning resources are currently available to registered Digimap users in the 'Playground' (<http://edina.ac.uk/digimap>). Feedback is being collected from users, and it is hoped that a full evaluation of the use of the resources can be undertaken with users once they become established in the curriculum. The content management system has still to be used by authors external to the e-MapScholar project team. This is perhaps the next challenge for the CMS.

There are also questions raised by the context of use study deserve further attention:

- Does effective online learning need to provide opportunities for communication as well as interaction?
- Do teaching and learning products have a finite lifecycle and how do we work to develop resources collaboratively within that framework?

And finally there is the issue of the wider applicability of the products developed. For example a role in staff development activities as an exemplar of best practice was suggested for the e-MapScholar products. Another pedagogical benefit of the products may be that using the system can provide tutors with a catalyst for re-evaluation of their own teaching (Collis et al., 2001).

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About the Author



Sarah Cornelius

School of Education, Hilton Campus
University of Aberdeen
Aberdeen AB24 4FA UK

email s.cornelius@abdn.ac.uk

Sarah Cornelius is a Lecturer in the School of Education at the University of Aberdeen in Scotland and an Associate Lecturer and online tutor with the United Kingdom's Open University.

Sarah's experience includes work as an independent Consultant in Online and Distance Learning undertaking projects for clients in the private and education sectors in the UK and USA, and Lectureship posts at Manchester Metropolitan University and the Free University of Amsterdam. She has published work on online learning and tutoring and the evaluation of computer based resources for learning. She also works in the field of Geographical Information Systems (GIS) and is co-author of a successful textbook and refereed papers on GIS.

Editor's Note: Theories of learning and instructional design can enhance effectiveness of distance learning. Dr. Clemons designed two visual / kinesthetic courses, one on interior design, a second on color. Multiple modalities enriched learning environment through observation, discovery, internet "field trips", and websites of famous architects, designers, and philosophers. Interaction was facilitated through discussion boards and email.

Developing On-Line Courses for Visual / Kinesthetic Learners: A Case Study

Stephanie A. Clemons

Key Words: Learning models, learners, modalities, online, visual, kinesthetic, higher education, case study

Introduction

Higher education institutions are pushing faculty to develop more online courses each semester. Many suggestions have been offered and many issues have been raised including the impact of online teaching on faculty load (Tomei, 2004), online learning teams (Betz, 2004) and tips for teaching online (Shelton & Saltsman, 2004). One issue that continues to surface is how to best deliver content to facilitate learning for the student (Bolliger and Martindale, 2004).

According to brain-based theory, learning is an active process in which students are challenged, offered ambiguities, and presented situations (Lucas, 2004). Learners need to be provided with many opportunities to make associations with knowledge and skills that they possess, yet form new thinking patterns and make new connections with presented content (Lucas, 2004). Most students have a preferred and secondary modality for learning that applies to traditional as well as online learning environments. Educators are quite aware of the learning styles that involve receiving information through 1) auditory (hearing), 2) visual (seeing), or 3) kinesthetic (physically experiencing or emotionally sensing) means (Lucas, 2004).

This paper offers a case study concerning how two online courses were developed for design students using their preferred learning modalities: visual and kinesthetic. Implications for online educators are discussed.

Review of Literature

Brain-Based Learning

The President of the United States and the Congress declared the 1990's as the Decade of the Brain. They predicted findings from the neurosciences would result in significant benefits for society (Lucas 2004). Neuroscientists study anatomy, chemistry, physiology, and molecular biology of the nervous system. They continue to make amazing discoveries about the brain and how it learns (Lucas, 2004).

For centuries, educators have used a model of teaching that presents information in a neatly packaged format. Many times, a step-by-step, outline approach is commonly used in higher education, yet the human brain does not naturally process information that way (Lucas, 2004).

Physiologically, the brain searches for meaning, pattern, interconnectedness, relevance, and useful applications (Greenleaf, 2003) while the genetic structure of the brain searches for meaning and relevance in its surroundings. As information is taken in, it is organized based on the meaning attributed to the stimuli. Thus, not all students learn in the same way due to impact from previous experiences and prior knowledge (Slavkin, 2004).

Understanding how the brain learns and relating it to the educational field resulted in the phrase: brain-based learning. As a concept and practice, it is defined as any teaching technique or strategy that utilizes information about the human brain to organize how lessons are constructed and facilitated with emphasis placed on how the brain learns naturally (Slavkin 2004). Brain-based learning offers a framework to understand how the brain processes information once it gathers it through various senses.

Learning Theories/Models

To understand learning styles and their relationship to online course development, it is helpful to review learning theories and models of learning. Although there are many theorists including Popper, Gestalt, and Piaget (Phillips & Soltis, 1998; Mezirow, 1991), and other models (Thornburg, 2004) this Review of Literature will briefly discuss three models of learning: David Kolb’s Four Steps of Individual Learning, Peter Honey’s Four Types of Learning Styles, Howard Gardner’s Theory and Model of Multiple Intelligences (Holmes, 2003). Then a brief review will be offered concerning individual learning styles, commonly referred to as *VAK* – *visual*, *auditory*, and *kinesthetic* (Sprenger, 2002).

For many of us, the word *learning* has something to do with memorizing when in actuality it carries with it the idea of developing something – a skill, knowledge, even the power of argument (Corder, 2002). Learning can be divided into three main types of skills: psychomotor (skills associated with physical abilities), cognitive (skills concerned with developing and increasing knowledge) and affective (skills concerned with a change in attitude). The latter skill is the most difficult to learn because we have an emotional attachment to our existing ideas (Vella, 2000).

Kolb’s Steps of Individual Learning

Learning, which maximizes an individual’s ability, must be varied, creative, social, analytical, joyful, and contemplative at various times. David Kolb’s learning model (Holmes, 2003) is probably the most widely known tool for describing the learning process and determining an individual’s learning preference. According to Kolb, the process of learning follows four steps that form a continuous, never-ending cycle: concrete experience, reflective observation, abstract conceptualization, and active experimentation (Figure 1).

<i>Concrete experience</i>	learning from experience
<i>Reflective observation</i>	reflecting on events, considering alternative courses of action, and seeking the meaning of things/events.
<i>Abstract experimentation</i>	formulation of concepts and generalizations through logical analysis.
<i>Active experimentation</i>	testing the implications of new concepts through conscious action.

Figure 1. Kolb’s Four Steps

Honey's Four Types of Learning Styles

In response to Kolb's four steps of learning, Peter Honey, an academician, identified four types of learning styles (Corder, 2002).

1. The first is the "activist" (concrete experience) learner who enjoys active ways of learning. They love new experiences or identifying fresh problems to solve; they thrive on the excitement of the moment and enjoy being a team member. On the other hand, they are not happy when they have to work on their own, have to follow precise instructions, or sit and listen to lectures. They enjoy participation and group learning.
2. Second, the "theorist" (reflective observation) learner enjoys having their minds stretched and challenged; they are analytical and happier with complex ideas. They are at home testing out assumptions and are rarely swayed by emotions. They would rather be dealing with ideas than emotions. They prefer not to make quick decisions and need to be allowed the time to examine their subject in depth. A theorist is uncomfortable with an activist.
3. Third, the reflector (abstract conceptualization) learner enjoys having plenty of time to observe what is taking place before embarking on a project. They feel at ease when they can ponder what they are doing and prefer not to work against deadlines. They feel resentment if there is an expectation for them to do something spontaneously.
4. Last, the pragmatist (active experimentation) learner enjoys being able "to see the point of something." They like to know that what they are learning is practical and has a useful output at the end of the course. They thrive on plenty of practice and often need strong guidance as to how to complete a task. They de-value theory and value anything that pertains to real life (Corder, 2002).

Multiple Intelligences

The well-publicized theory of "multiple intelligences" was developed by Howard Gardner at Harvard. He advocates that every individual has eight "intelligences," some of which are used more than others. Gardner identified the intelligences as linguistic, logical-mathematical, spatial, bodily kinesthetic, musical, interpersonal, intrapersonal, and naturalist (Lucas, 2004; Holmes, 2003; Sprenger, 2002) (See Figure 2).

The naturalist was the most recent intelligence added to the Gardner's list. Previous intelligence tests, based on logic and linguistic exercises, consistently separated children into two basic groups: intelligent and unintelligent (Lucas, 2004; Holmes, 2003; Dickinson, 1996). Youth completing elementary and secondary education were labeled "intelligent" if they were good at math or spelling (those subjects supported by the intelligence tests) or "non-intelligent" – and subsequently labeled "athletic" or "creative" (Campbell, 1992). Today, educators believe that youth maintain multiple intelligences previously unidentified.

Howard Gardner's Multiple Intelligences

Linguistic – ability to read, write, and communicate in a variety of ways. It includes the ability to tell stories, write reports, and critically analyze written material.

Logical-mathematical or Mathematical technical – the ability to reason, calculate, think in a logical manner and process information. It includes the ability to solve technical problems, use the principles of scientific enquiry, logical thinking and the ability to make objective decisions. It relates to general financial skills and basics of project management.

Spatial or Visual – the ability to think in pictures and visualize a conclusion or result. It includes a concern for the aesthetic and the ability to translate visual representations to the real world.

Bodily kinesthetic or Kinaesthetic moter – the ability to solve problems or manipulate items using one's own body or parts of the body. It is a self-focused sensitivity for the physiological feedback from the body. It includes the ability to use complex machinery and undertake intricate work.

Musical-rhythmic or Auditory – ability to create or compose music and to understand, interpret, and appreciate it. It is associated with the sensitivity for the dynamics of sound and is typically associated with musicians.

Interpersonal – ability to understand others, their emotions, traits, and abilities and how best to interact with people. This includes the ability to take into account another person's emotions and adjusting your behavior accordingly. This intelligence, along with Intrapersonal, comprise the backbone of emotional intelligence and is one of the essential characteristics of a leader.

Intrapersonal – ability to form accurate perceptions about oneself and use the knowledge to effectively function throughout life. This includes the ability to know oneself in terms of goals, ambitions, feelings and emotions – known as the “inner game.” This includes coping skills, resilience, and determinations. It represents one of the most significant checks for pure intelligence, yet many very bright people lack this type of intelligence. The key skill of this type of person is the ability to reinvent oneself over time. This is an essential skill for the lifelong learner, who needs to be adaptable and willing to accept change.

Naturalistic intelligence – ability to observe, understand, and classify patterns in nature. This is associated with the ability to relate to or profit from the natural environment, including its exploitation.

Note: A ninth intelligence identified by Gardner is *Philosophical Ethical*. This refers to the ability to match skills and abilities to different environments, including cultural. It also extends to having a sensitivity for the moral and ethical issues of a situation (Holmes, 2003).

Excepts taken from Holmes, 2003 and Lucas, 2004.

Figure 2. Howard Gardner's multiple intelligences defined.

VAK

The brain gathers information, assimilates it, comprehends it, and translates it into action, thereby completing the learning process (Lucas, 2004). Most people have a preference during the learning process for a certain approach or modality. These preferences, known as learning styles, impact how we receive information in the brain. Learning styles include auditory (hearing), visual (seeing), or kinesthetic (physically touching/experiencing) (Lucas, 2004; Sprenger, 2002).

The *auditory* learner assimilates information best if derived from group discussions, music, sounds, audio tapes, reading aloud, panel discussions, reviewing aloud, and vocal variety (Lucas, 2004). They learn by talking and listening. Information does not seem real to them until they have had a chance to discuss it. They prefer to give an oral book report rather than develop a written one (Sprenger, 2002). To meet needs of auditory learners, it is important to incorporate aural stimulation such as music, debates, interactive CD-ROM, tape recordings, or demonstrations involving verbal explanations (Lucas, 2004). Dialects come easily to many auditory learners; yet sitting quietly still is the most difficult of tasks. They are extremely sound sensitive. The auditory learner is the one who is looking out the window as the instructor teaches the material or is observed talking to himself/herself as he/she reads. Their auditory memory is sometimes stored in an unusual fashion, similar to a cassette tape. To find the answer to a question, rather than visualizing the diagram on a page as the visual learner would do, the auditory learner rewinds and fast forwards gathered information in the order in which it was stored. The auditory learner may have a problem when test questions are not found in the same order in which the content was presented (Sprenger, 2002).

The *visual* learner appreciates stimuli related to symbols, posters, drawings, images, various fonts, diagrams/charts, extra white space (negative space in a composition), bold lettering, visual aids, pictures, color, visualization activities, and highlighting techniques (Lucas, 2004). They appreciate seeing information shared through words and pictures. They may not hear what is being said, but they will “see” what is meant (Sprenger, 2002). Visual learners “visualize” as the information or stimuli is being received, creating scenes to better able recall shared content. Visual learners appreciate brightly colored papers, posters with content tied to the session as well as quotes, stories, analogies that relate to points made in the session. Cartoons, graphics, caricatures, even on handouts are appreciated. Video segments or visualization activities that help the learner envision the content discussed (Lucas, 2004) and encourage visual memory (e.g. a “picture is worth a thousand words.”). In a traditional classroom, they would be the students sitting in front of class, watching the teacher very closely, seemingly entranced with what was being taught (Sprenger, 2002).

The *kinesthetic* learner gathers information and gains maximum understanding through involvement in an activity or performing a task. These can include games, movement, actual items, field trips, group discussions, demonstrations, note taking, active learning, and model-building (Lucas, 2004). They need movement and hope for action. These students gesture a lot with their hands and when memorizing materials will walk with the information in their hands. Kinesthetic learners have the most difficulty in traditional classrooms (Sprenger, 2002). Rows of chairs, sitting still in a lecture hall, being quiet when asked are difficult tasks. Kinesthetic learners have trouble in our predominately auditory and visual world. It has been described as being asked to walk into a totally dark room and being asked to read (Sprenger, 2002). Kinesthetic learners respond to physical closeness and physical rewards. They enjoy positive reinforcement and use touch during times of verbal communication.

Case Study

Two on-line courses were developed during two summer breaks for interior design students at a higher education institution. Interior design students' preferred learning modalities include first, visual and second, kinesthetic. The online courses were developed using the "lone ranger" approach which is by far the most common model of technology course development (Yoon, 2003). Although it was important to develop the course based on learning objectives, technology as a delivery method, and assessment of learning and evaluation, it was also critical to develop it based on how the design students learned.

The two courses involved content concerning 1) the introduction to interior design and the profession and 2) color and color theory. The introduction to interior design course (100 level) had to closely mimic the resident instruction course (in content) that was offered both fall and spring as it acted as a "gate" for interior design majors to successfully move to the next program level. The color course (300 level) was an elective course for interior design majors but served the student population on and off-campus as the only color course offered through the institution. Both courses required students to purchase textbooks.

The courses were developed with three basic thoughts in mind: 1) "how can the information be delivered using multiple modalities" and 2) "how can assessment of student learning be obtained keeping multiple modalities in mind" and 3) "how can technology enrich the learning environment – using it to its advantage for online learners." Following are some of the techniques used to teach the content of interior design and color to visual and kinesthetic learners. Note that the visual modality is used most frequently in delivery and assessment.

Visual Modality

- *Internet field trips* – implemented to encourage learning through observation. Students visit websites of famous architects and designers (e.g. Michael Graves http://www.michaelgraves.com/prof_firm.asp) to listen to audio clips of design concepts and philosophies. Or they visit Frank Gehry's website to observe form and shape as used (relates to real life application and learning) in the design field (e.g. http://www.greatbuildings.com/buildings/Experience_Music_Project.htm) They visit national international websites concerning color and color theorists (e.g. <http://cvision.ucsd.edu/>) or observe how color was used to garner awards for that profession (e.g. <http://www.asla.org/awards/2003/design.htm>).
- *Internet Scavenger Hunt* – implemented to encourage learning through discovery and exploration. Students download the assignment sheet that gives ten to twelve websites to explore as related to the interior design profession (e.g. www.asid.org) or color usage (e.g. <http://char.txa.cornell.edu/language/element/color/color.htm>). Questions were posed on the assignment sheet in a format that necessitates students search and locate critical information about the topic. Students were required to also to attach websites and digital images to the finished answer sheet before uploading it to the professor. In that way, they were encouraged to not only discover, but explore the topic themselves.
- *Discovery and Identification* – implemented to assess accurate identification of information covered. Students were asked to go out into their communities to capture digital images of content covered in class and upload them for review.
- *Response and Analysis* – implemented to encourage analysis of a professional topic. (see Fig. 6) Students were asked to select and view a design-related reality show and compare and contrast it to the interior design profession. Students' analysis was captured in a written paper and uploaded to the professor.

- *Lectures via Powerpoint* – implemented to deliver content with corresponding examples. Each lecture was developed with visual images that depicted the principle, topic, or evaluation outlined in the syllabus. More text was used in the lectures, as compared to resident instruction courses, to describe the importance and application of each image as it related to the topic.

Kinesthetic Modality

Model Building – implemented to encourage learning through creativity and construction. Students were asked to construct a structure of their choice from the “inside out” based on a Bauhaus project. They downloaded the assignment sheet, triangular shapes that were used to develop the cardstock model and a Powerpoint presentation of previous student work. Once the model was completed, students were requested to upload five to seven digital pictures of various views of the model for grading purposes.

- *Color Mood Boards* – implemented to encourage learning through cultural and symbolic color application. Students were asked 1) to research and study use of color in various cultures and countries and 2) replicate the color mood from a professional photograph. When completing the first mood board, many times students selected a culture or country from personal family history. Professional colored papers were used to communicate the culture through shapes and forms, scanned the finished board and uploaded it for grading purposes. Students also had the option to use various paint programs to develop their color mood boards. The designs were then saved as jpegs and uploaded. See Figures 3 -6.

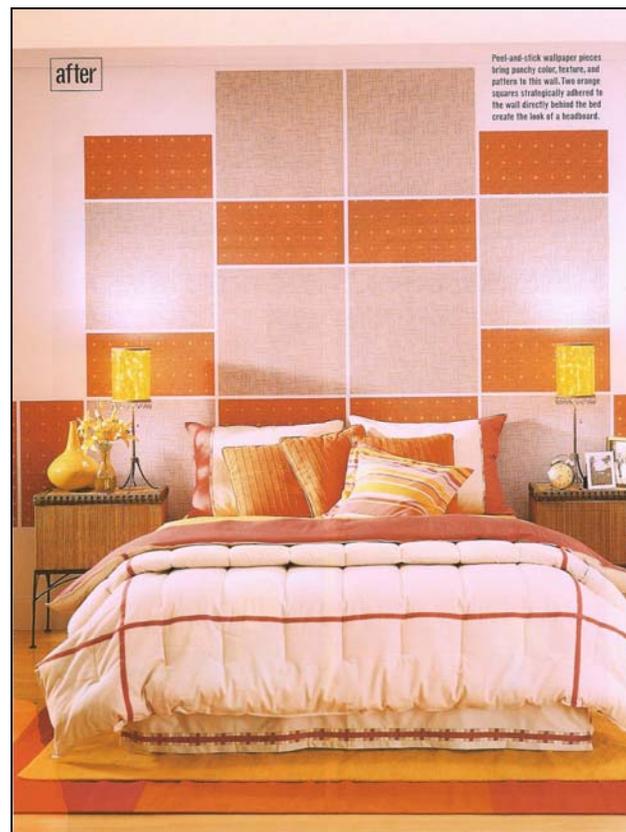


Figure 3 – Professional magazine picture used in interior design course for analysis and response

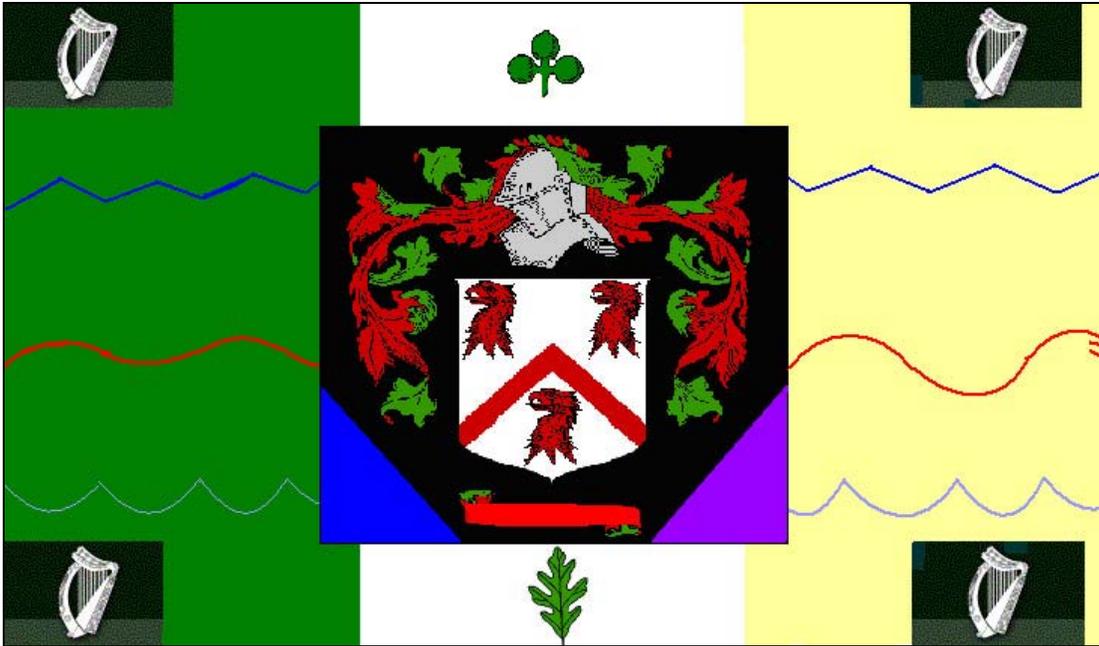


Figure 4 – Cultural use of color – Ireland.



Figure 5. Cultural use of color – China.

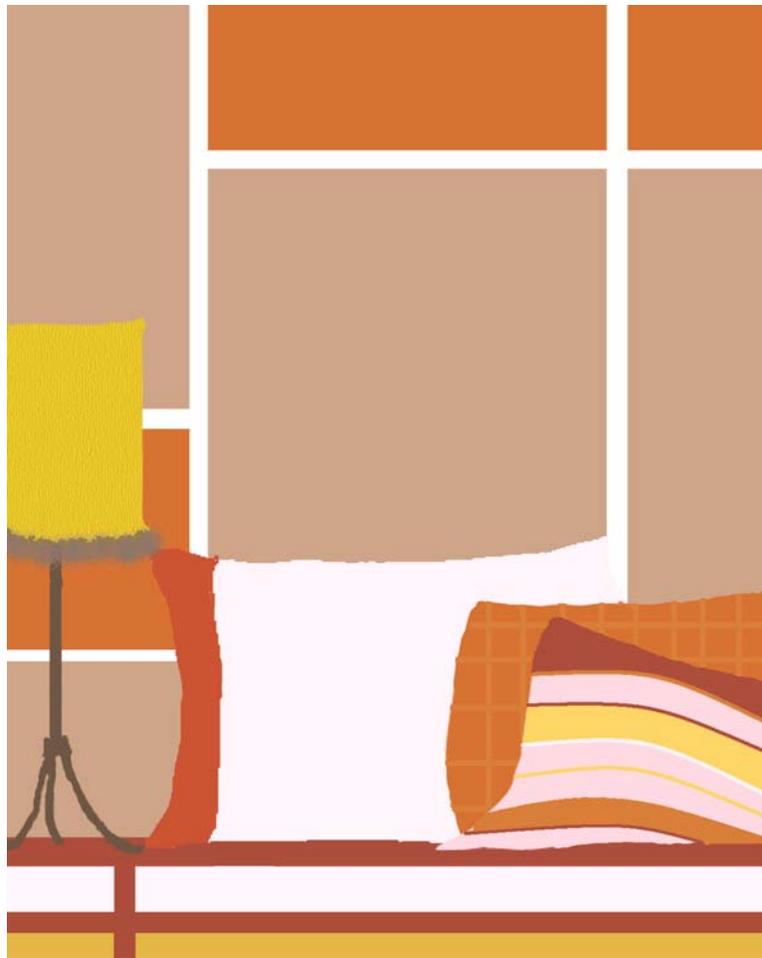


Figure 6. Color Mood Board to study cultural use of color.

- *Concept Boards* – implemented to encourage learning through visual depiction and communication of design concepts. Many times clients cannot visualize the concept a designer is trying to communicate. Use of concept boards is common in the profession and was mimicked in this course to assess student visual communication skills. Students used word analogies to drive the concepts. They then used a variety of media to depict their finished concept designs, scanned the final project and uploaded it. Again, paint software was allowed if the student selected that option.

Note: PowerPoint presentations of student work were offered for all kinesthetic assignments to help visual learners understand the scope of the project, yet not stunt creativity. In addition to the above described projects and exercises, students were required periodically to submit research papers and take online, multiple choice exams. Group discussions were encouraged but not a required component of the class.

It is important to note that although these courses were developed with visual and kinesthetic learners in mind, the next step in the course development (as budget allows) involves the implementation of audio clips in the PowerPoint lectures. Audio clips would assist in clarifying learning bullets, as well as adding expression and texture to the course. Interviews with design professionals, previous students, and clients will enable students to hear personal stories that will enrich the learning environment.

Observations, Findings & Assessment

Findings of this case study (via teacher-posed questions and group discussions) indicated that students in the courses were predominately non-majors who accessed the course from such locations as Spain, the Virgin Islands, Canada, Italy, and far-flung states in the U.S. They took the courses not only for their major or college credits, but because they were interested in the topic. Many indicated that they would not be able to take a college course if it had not been offered online. Digital cameras and cell phone capabilities make capturing required images relatively easy. One student, vacationing one summer in a Wisconsin cabin, built her model, borrowed a friend's cell phone to capture the images of her model, and uploaded them for grading purposes.

Students remarked on the enjoyment of the visual and kinesthetically-driven assignments. Issues that evolved in the course were technology related such as how to refresh the screen to allow exam completion or software related such as how view "my grades" in WebCt.

Interaction is a key issue with online courses (Aragon, 2003). Moore (1989) identified three types of interaction essential in distance education: 1) learner-instructor, 2) learner-content, and 3) learner-learner. Students kept in consistent content via email and discussion boards concerning various aspects of the course (learner-instructor). The professor offered positive reinforcement comments throughout the course. Students indicated that early engagement with visual/kinesthetic exercises kept them engaged in the course (learner-content). In fact, many offered other ideas for visual and kinesthetic exercises. Students helped students throughout the course via use of discussion boards or personal email.

Based on previous teaching experience, assessment of student work indicated similar quality as equivalent resident instruction courses. Student discovery and exploration exercises seemed to encourage more learning based on exam scores. Student feedback indicated enjoyment of learning via visual and kinesthetic exercises. There was also expressed an enjoyment with the independence of technology as well as the autonomy in online and e-learning. Challenges for the educator include implementing studio projects without hands-on, teacher-student interaction (e.g. not being able to see the "whites of their eyes", learning WebCT, developing new projects, and remaining abreast with the student learning and rhythm of the course.

Two suggestions for future research would be to 1) utilize "learner analyses assessment" (e.g. Learning Modality Self-Assessment, Lucas 2004) at the beginning of online courses to determine if there are certain types of learners that select that particular course and how best to deliver the information to enhance learning and 2) assess learner modality types of online instructors to determine if there is a predominance in this evolving arena of education.

Conclusion

Viewing online learning as an alternative form to traditional classroom learning, where technology interactions emulate face-to-face-interactions is a common mistake (Aragon, 2003). Human senses are in constant operation with scientists estimating that a human brain receives thousands of different bits of information every second during consciousness (LaBerge, 1990). Allowing learning modalities to drive development of online courses offer opportunities for successful completion of the student learning process. As the educator, it is important to analyze the self-preferred learning modality to avoid designing and delivering information in a format that is comfortable for self, yet ignore learning preferences of others. The result would be a breakdown in the student's learning cycle (Lucas, 2004). Current technologies enhance the development of meaningful online learning experiences.

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About the Author

Stephanie A. Clemons, Ph.D., FIDEC, ASID, is an Associate Professor in the Department of Design and Merchandising at Colorado State University. Her doctorate is from the School of Education. She is a Past President and Fellow of the Interior Design Educators Council (IDEC) (www.idec.org) and currently serves on the Educational Training Area Council (ETAC) for the American Society of Interior Designers (ASID) (www.asid.org), the leading professional organization for interior designers with more than 34,000 members. She has received numerous teaching awards, and has published extensively – both refereed and non-refereed articles. Her specialty areas relate to technology and education. Clemons has presented research both nationally and internationally (including in South Korea's World Congress and at the South Africa IFI Conference) and has taught in higher education for over 20 years. Clemons has been teaching online courses for two years.

Dr. Clemons can be reached at sclemons@cahs.colostate.edu.