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The International Journal of Instructional Technology and Distance Learning is refereed, global in scope, and focused on research and innovation in teaching and learning.

The Journal was established to facilitate collaboration and communication among researchers, innovators, practitioners, and administrators of education and training programs involving instructional technologies and distance learning. The editors and peer reviewers are committed to publish significant writings of high academic stature.

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Donald G. Perrin
Executive Editor

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Editorial

Web Statistics-Annual Report

Donald G. Perrin

In August 2004 the Journal adopted SmarterStats Professional™ for reporting statistics. Since August 1, 2004 the number of visitors to *itdl.org* has increased from approximately 4,500 to 16,500 each month– a fourfold increase. Page views increased from 6,500 to 22,500 per month -a total of more than 200,000 page views for the entire year. Add to this 72,600 Acrobat file downloads of entire issue. Bandwidth has increased six fold from 500 megabytes to 3,000 megabytes per month for a total annual bandwidth of 24,401 megabytes.

The most read topic is learning objects, followed by connectivism and critical thinking. The most read article is *Connectivism: A Learning Theory for the Digital Age (January 2005)* by George Siemens. It has 7,042 page views for the HTML page and more than 6,100 downloads of the Acrobat file. Rory McGreal's *Learning Objects: A Practical Definition* (September 2004) is next with 5,930 page views and 4,877 downloads of the Acrobat file.

Of the hundreds of search engines used to find articles, Google represents 80%. Google has about 1500 listings of which we are aware. This is ten times the number of articles published due to blogs and references on other websites. The United States has the largest reader population with 45.6% of visitors of known origin from over 170 countries. As an International Journal, we met our goal to have at least one third of published articles from outside the United States and 50% or more of the readership from outside the United States. Countries with the largest readership are:

Country	#	%
United States	69,555	45.6
United Kingdom	6,309	4.1
Canada	5,879	3.9
Australia	4,419	2.9
Brazil	3,131	2.1
Malaysia	1,818	1.2
China	1,803	1.2
Spain	1,604	1.1
India	1,499	1.0
Germany	1,474	1.0

Note: *Country* could not be identified for 29,719 or 19.5% of the total visits. It is assumed that the distribution of countries is similar for the unidentified items.

Authors and readers are invited to make suggestions to improve this journal to dperrin@itdl.org.

- In the near future, the Journal will add-books in Acrobat format to download free under the Creative Commons license.
- The Journal will add an index to make past and present articles easier to locate.
- The team of referees will be increased in size under new leadership.
- The Journal is seeking additional sponsors to add services for contributors and readers.
- Journal policy is to publish articles in the next issue after acceptance by the referees.

Editor's Note: The international focus on reusable learning objects comes this time from China and France. Each new contribution adds function and value for the researcher, practitioner, and learner. The philosophy espoused here is that all stakeholders in the design, teaching and learning processes are both producers and consumers and their collective activities contribute to future development.

A Multi-Agent Enabled E-Education Object and Course Authoring System (MEEOCAS)

Anbo Meng, Luqing Ye, Romuald Stock, Pierre Padilla

Abstract

The paradigm of developing on-line courses by assembling existing e-education objects (EEO), stored in databases, is increasingly revealing its advantage and attracting more and more attention of researchers and practitioners in the e-learning domain. However, there is still not an acknowledged definition: what constitutes an EEO or what size such an EEO should be to maximize its reusability and flexibility capacity.

In this paper, firstly, the design philosophy of MEEOCAS was identified: All the roles (i.e., Learners, course /EEO designers and teachers using MEEOCAS) are both consumers and producers who do not only benefit from but also contribute to this system. Based on the principle mentioned above, an abstract conceptual model of EEOCAS was designed. It provides an efficient and powerful mechanism to facilitate the developing process of courses and learning objects by virtue of the incorporation of software agents and learning object technologies.

Secondly, for our purpose, a new definition of learning object—EEO, which stems from the idea of Object-Oriented Programming (OOP) and the model of Cisco's reusable learning object (RLO), was put forward. Furthermore, an XML based EEO packaging model was also described.

Thirdly, the implementation model of MEEOCAS based on JADE (Java Agent DEvelopment Framework) platform fully complying with the FIPA specifications was presented. Relying on the common platform, all the involved agents can conveniently communicate, collaborate, and negotiate with each other, in order to perform some specified tasks using the common domain ontology and XML content language.

Finally, some application scenarios based on UML schema, such as searching the appropriate EEOs, subscription to LMMA and the negotiation between course and EEO developers, were demonstrated.

The aim of the MEEOCAS project is to make easy the development and deployment of learning contents and to build a self-improving and increasingly accumulated e-education resource library.

Keywords: E-education object, multi-agent, XML, JADE

Introduction

As is known that "content is king", therefore, as far as e-learning is concerned, one key issue is how to develop instructional materials of high quality that could be reused and applied to different contexts. Unfortunately, these instructional contents are, traditionally, expensive and time-consuming to produce. In most situations, course authors have to create their new course from the scratch, even though numerous referenced instructional materials are conveniently accessible: course developers (authors/teachers) have to break them down into smaller constituent components at the beginning, and then modify or reassemble them in their own way that supports their individual instructional goals. Such repeated creating process, undoubtedly, is toilsome,

tedious and time-consuming. The more important point is the difficulty in sharing and reusing of these courses even when they are available, how to share and reuse them is still a big problem. Since the traditional courses generally fixed in length, sequence, and scope, are built as such a large monolithic structure that it is difficult to re-purpose them into other contexts at such a course-grained level via Internet. In fact, this large and inflexible structure misses out on most of the benefits to authors and learners.

Fortunately, the recent emergence of learning object seems to be a promising solution to the problem due to the potential of its reusability, interoperability, adaptability, and scalability. However, another issue arises when taking into consideration how to apply these ready-made learning objects to course authoring system and deploy them to the learning process in an efficient and flexible manner. To address this issue, the agent technology has been introduced in MEEOCAS. The combination of learning object and agent technology makes it possible for MEEOCAS to facilitate the development of course and learning object itself, and furthermore, to personalize learner's learning process and patterns.

Design Principle and Concept Model of MEEOCAS

When considering the design of MEEOCAS, to overcome the inflexible monolithic structure of traditional course and the low efficiency of creating process, as well as, to comply with the functional requirements of different occasions, our philosophy is: *Learners, course materials designers and teachers are both consumers and producers when using MEEOCAS.* That is to say, learners, course materials designers (i.e. learning object designers and course designers) and teachers not only directly or indirectly benefit from MEEOCAS but also contribute to MEEOCAS and thus a self-improvement and increasingly accumulated learning resource library can probably be worked up. Figure 1 is the concept model of MEEOCAS, in which, we introduced the well-known concept of *learning object* as supporting groundwork, which can be re-purposed for many use and we emphasize more on the performance support than simply an information system composed of learning objects. From learning activity-enabled perspective, learning object will play a key role in several aspects in MEEOCAS (see figure 1) as follows:

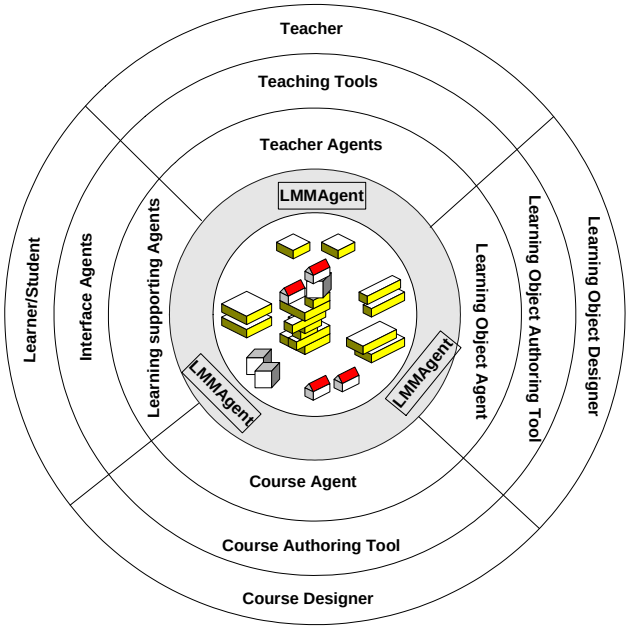

Figure 1. Concept model of MEEOCAS

- Facilitating the development of courseware, thanks to the reusability, deliverability and discoverability of learning object, mainly through the support by Course Assistant Agent (CAA) in cooperation with both Learning Material Management Agent (LMMA) and Object Learning Assistant Agent (OLAA).
- Facilitating the development of learning object in virtue of its modifiability, inheritability, and discoverability etc. This process is chiefly assisted by OLAA and LMMA.
- Providing learners with personalized learning experiences and tailored learning services through intelligent navigation and dynamic learning paths modification according to their own learning performances and profiles in automatic tutoring mode, which is supported by the cooperation and coordination between Pedagogic Agent (PA), Learner Model Agent (LMA), and Evaluation Agent (EA) etc.
- Teachers can gain access to learning object libraries and make full use of them in teacher-centered learning mode with support from Teacher Assistant Agent (TAA).

Definition of Learning Object in MEEOCAS

In the e-education context, the emergence of learning object is assuredly exciting and encouraging. As [Wiley 2000] says Reusable Learning Objects (RLOs) are emerging as the "technology of choice in the next generation of instructional design, development, and delivery, due to its potential for reusability, generativity, adaptability, and scalability." It is certain that having a library of learning objects to draw on will sharply shorten the course development time when allowing for faster deployment of the learning and personalize the learning process.

However, learning object is a relatively new term, thus we are not surprised to find numerous versions of different definitions of learning object: Learning Object Metadata (2001)-IEEE 1484.12.1 defines a learning object as "any entity, digital or not-digital, which can used, re-used or referenced during technology supported learning". Cisco (2001) defines a learning object as "a granular, reusable chunk of information that is media independent". Wiley (2001) defines learning objects as ''elements of a new type of computer-based instruction grounded in the object-oriented paradigm of computer science".

Besides various definitions of learning objects, there are also a large amount of terms relevant to it, like "Reusable Learning Object (RLO)", "Reusable Information Object (RIO)" (Cisco 2001), "Assignable unit", "Sharable content object (SCO)" (ADL SCORM 2001), "knowledge objects" (Merrill, Li, &Jones 1991), "online learning materials" (MERLOT 2000), "educational software components" (ESCOT 2001) and etc. This paper uses the term E-education Object (EEO) to describe its purpose and functionalities. Here gives the definition of EEO conforming to the functionalities requirement of learning object in MEEOCAS:

> *An E-education Object (EEO) is a reusable, modifiable, scalable, inheritable, polymorphous and multipurpose component that encapsulates well-organized "raw assets" (i.e. contents, practices and assessments) as well as a common interface attached to it.*

This definition is derived from some concepts of object-oriented programming, and also references to the models of ADL's SCORM and Cisco's RLO. It is found to be an effective way to describe and construct an EEO. The more detailed interpretation is given as follows:

- Reusability indicates that an EEO can be reused in certain context at random times without any modification.

- Inheritability implies that an EEO can be entirely or partially (contents, practices or assessments) inherited by other ones. By this means, a wonderful experience of creating a new EEO applied to other contexts can be gained.
- Modifiability denotes that an EEO can be modified and then form a new EEO, e.g. when an EEO becomes out of date or not appropriate for most learners, this EEO should be updated, modified or even deleted.
- Scalability refers to the granularity of a learning object that can range from as small as a section to as large as a lesson. (Note: in MEEOCASS, the hierarchy of a course is like this: course->unit->lesson->section. In principal, the largest learning object is constrained within a lesson consisting of units, several of lessons constitute a course intended to deliver in MEEOCAS to learners for accomplishing their knowledge, skill, competence etc.)
- Multipurpose implies that an EEO can be applied to several contexts. E.g. in MEEOCAS, an EEO can be used by several actors/participants such as learners, teachers, EEO designers, Course designers and related agents.
- Polymorphous implies that the same subject matter may possibly own several versions of representing forms, e.g. simulations, demonstration, experiments, animations, html, text, video clip and games etc, which are likely to point to a single learning objective in order to accommodate to different learning style.
- EEO is a structural component that consists of well-organized “raw assets” such as content, practice and assessment.
- EEO has a common interface which makes it possible to be accessed, discovered and connected to the outside world.

Of course, the issue of intellectual property has to be taken into account when an EEO needs to be modified or reused by others rather than the original creator, an imaginable approach to this problem is to get the permission of the original copyright holder or else pay for the reuse of it.

Structural Model of EEO in MEEOCAS

Firstly, we introduce and discuss an influential model—Cisco Reusable Learning Object (RLO) Model and then present a more flexible and practical structural model of EEO on the basis of it.

As a worldwide leader in networking for the Internet and one of the forerunners in learning object design, creation, and deployment, Cisco is also actively participating in standards groups such as IMS and ADL, whose RLO strategy has been attracting extensive attention all the while. As such, it is worth taking a look at their RLO structure. The Cisco RLO is created by combining an overview, a summary, and from five to nine (7 ± 2) reusable information objects (RIO) (see figure 2). Each RIO is built upon a single objective. Several RIOs are combined together to create a Reusable Learning Object (RLO). If a RIO can be equated with an individual component of a learning objective, a RLO is the sum of RIOs needed to fulfill that objective. To aid in content standardization, each RIO is further classified as concept, fact, procedure, process, or principle. Each of these RIO types has a recommended template that authors can follow to build the RIO.

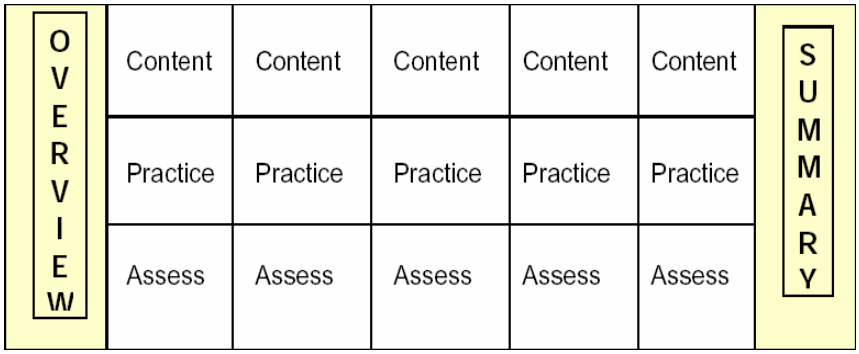

Figure 2. Cisco's RLO and RIO
(Note: each column represents a single RIO)

As above-mentioned, the reusability of Cisco's RLO model occurs at the level of RIO. Its internal elements (i.e. content items, practices items and assessment) cannot be reused in other contexts. Consequently, it is inconvenient and inflexible in the situation in which we only need reuse or inherit part of a RIO. According to ADL SCORM, any deliverable "raw medias", such as illustrations, documents or media streams, can be seen as "assets" ready to be reused in other "content object". Although a single "asset" cannot be used as a learning object alone, multiple learning objects can reuse these assets for gaining their objective. Consequently, from our standpoint, each content, practice or assessment in Cisco's RIO is also a valuable asset which seems to be a more "meaningful chunk" than "raw media" mentioned in ADL SCORM.

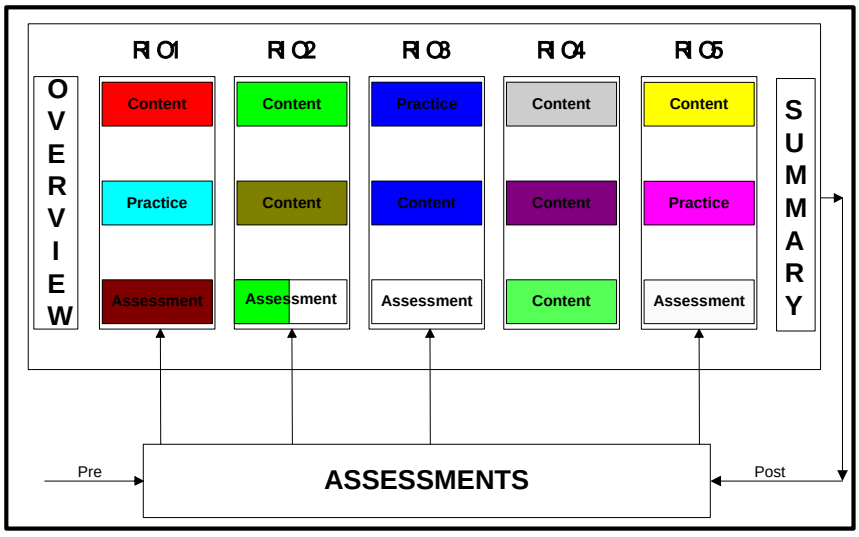

Figure 3 Recommended E-education Object (EEO) Modal

From figure 3, we can see that there are mainly two differences between the Cisco RLO model and the recommended EEO model: Firstly, the recommended model still contains several RIOs, but the structure of each RIO included in an EEO is not exactly the same. In Cisco RLO model, and yet all RIOs are as like as two peas, i.e. the internal structure and sequence

(content-> practice ->assessment)

of each RIO is unchangeable. In recommended EEO model, however, the inside of different RIOs may manifest different structures and sequences. An example is that, in RIO3, the component

"practice" can possibly appear before the component "content" for some specific need. In another example, RIO4 may only contain the elements "content". The second and also the most different point is that in the recommended EEO model, all the "assets" such as contents, practices or assessments in an EEO can be entirely or partially reused /inherited by other EEO. To be more exactly, all the boxes of different colors representing different assets in figure 3 can possibly be reused in other contexts. An example is used here to illustrate this idea. In Figure 4, assuming that an EEO designer is creating a new EEO3, like a course designer does, it is not necessary for him/her to develop this EEO from the scratch since there is a library of existing EEOs "waiting" for reuse. So the creation of EEO3 is relatively an easy and comforting process.

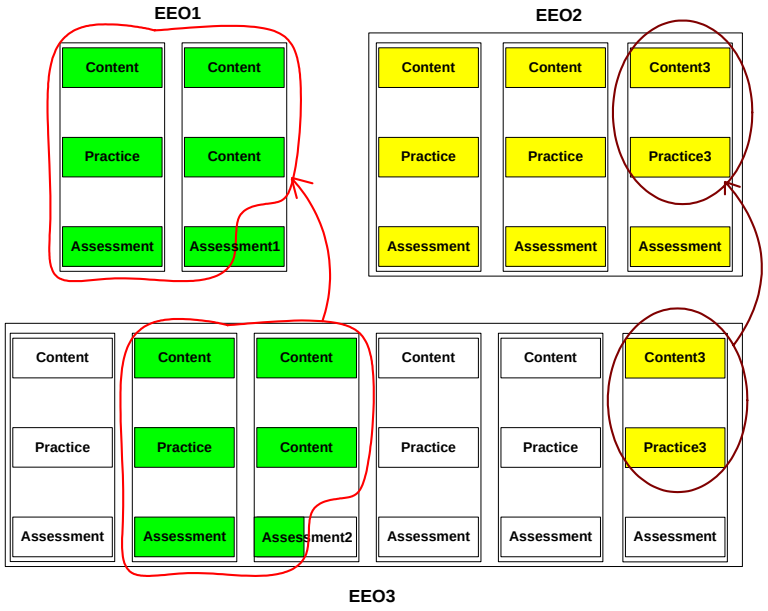

Figure 4. An example of demonstrating how to inherit assets from existing EEOs

As you see in figure 4, the accomplished EEO3 has inherited content3 and practice3 from EEO2 and furthermore almost all the assets in EEO1 with the exception of component "Assessment1" that has modified into Assessment2 in EEO3. Of course, the remainder represented by white boxes is created by the EEO designer himself/herself.

Using the recommended EEO model can bring us many benefits: On the one hand, it provides more flexibility and greater return on investment from the perspective of reusability and commerce. For example, in learning object-oriented learning pattern, a learner can make use of an EEO as a stand-alone performance support tool. The EEO gives learners the learning context, knowledge and skills needed to perform the given objective, and a method to assess mastery. EEOs and RIOs can also appear as offerings on a "road map" that is customized to the needs of each learner. Learners can see from this road map what they need to take, what they have completed, and what their learning destination is.

On the other hand, we can adequately "borrow" from Cisco other advanced ideas in building a learning object, such as its strategies of taxonomy and sequencing. What excites us most is that, based on our multi-agent system, a flexible, personalized and dynamical e-education environment can be formed because of the "participation" of EEO.

Package Model of EEO

After an EEO is well accomplished, it has to be packaged and stored into database so that it can be reusable and accessible. When considering encapsulating an EEO into the package, it is a good practice for us to comply with some international specifications or standards (e.g. the specifications and standards of IMS, IEEE and SCORM). In the package, the key is to clearly describe the structure of an EEO and its corresponding resource. Fortunately, metadata has this ability to provide a common means to describe things so that EEOs can be self-describing and can be searched, found and applied to a specific context. Here gives a recommended package model of EEO (see figure 5), which includes: manifest XML, EEO metadata XML, RIO metadata XML, Raw asset metadata XML, Physical files and Package interchange file (PIF). Their functions are described as follows:

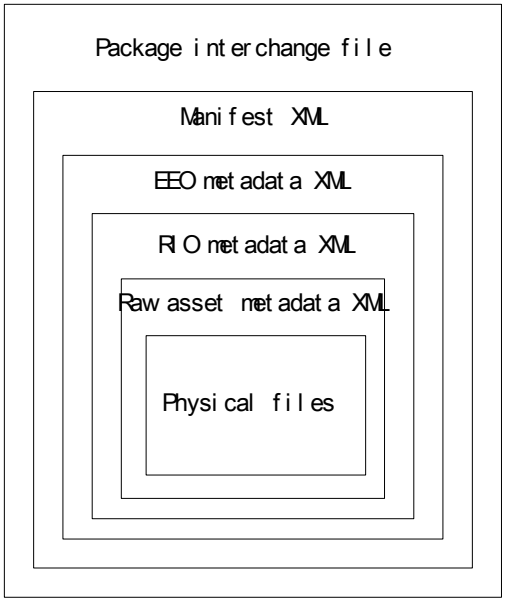

Figure 5. A recommended EEO package model

- PIF: it can be a zip file or other archive format allowing for standalone external use.
- Manifest XML file: it describes the file list needed when using the EEO.
- EEO metadata XML file: it describes the structure and other metadata information such as General, Lifecycle, Metametadata, Technical, Education, Relation and Classification etc.
- RIO metadata XML files: it describes the content construct.
- Raw asset files: it describes itself.
- Physical files: The physical files are the actual resource files.

Architecture of MEEOCAS Based on JADE

As mentioned above, it is sure that having a library of read-made EEOs to draw on will sharply shorten the course developing time. However, when allowing for how to make them to be deployed conveniently in a system and to be found easier by EEO and course developers, obviously, we still need a common communication environment to support it. Naturally, we introduce multi-agent technology to realize our system—MEEOCAS, which is based on Java Agent Development Environment (JADE 2003). JADE is a software framework fully implemented in Java language. It simplifies the implementation of multi-agent systems through a middle-ware that claims to comply with FIPA specifications and through a set of tools that support the debugging and deployment phase. The agent platform can be distributed across network and the configuration can be controlled via a remote GUI. According to our experience of using JADE, it justifies this feasibility of building a flexible and powerful MEEOCAS (see figure 6) with JADE.

From figure 6, we can see that learning material-side agents reside on server-side. However, the course interface agent, course assistant agent, EEO interface agent and EEO assistant agent can move to or be downloaded on the client-side so that all the EEO and course authors can conveniently develop their EEOs or courses at dispersed places. It is worth of note that MEEOCAS is a peer-to-peer distributed system that provides a common channel for communication, so the boundary of server side and client side has become somewhat blurry in most cases. The following is their functionality description of all involved agent in MEEOCAS and their further applications will be presented in the next section.

- *Course interface agent (CIA)*

  CIA serves as a GUI of the course author. CIA provides a template-based course-authoring tool that facilitates developing consistent courses composed of EEOs. Besides, as an autonomous agent, CIA has all the characteristics of an agent.

- *Course assistant agent (CAA)*

  CAA helps course author perform many specific tasks such as searching existing EEOs, subscribing services (e.g., EEO) to LCMA, negotiating with other EEO authors, etc.

- *EEO interface agent (EEOIA)*

  Like CIA, EEOIA provides an EEO development environment facilitating EEO authors to develop consistent EEO/RIO

- *EEO assistant agent (EEOAA)*

  Like CAA, EEOAA performs many specific tasks such as searching existing EEOs, subscribing services (e.g., EEO) to LCMA, negotiating with other course authors, etc.

- *EEO provider agent (EEOPA)*

  EEOPA is responsible for the communication with EEO repositories/databases

- *Course provider agent (CPA)*

  CPA is responsible for the communication with course repositories/databases

- *Learning material management agent (LCMA)*

  LCMA is responsible for the management of life cycle of all involved agent in MEEOCAS such as the creation, deletion, suspension, resumption, authentication and migration of agents. LCMA also provides the yellow page service. For example, when an

EEO accomplished, it can be registered with LCMA agent so that course author can find it.

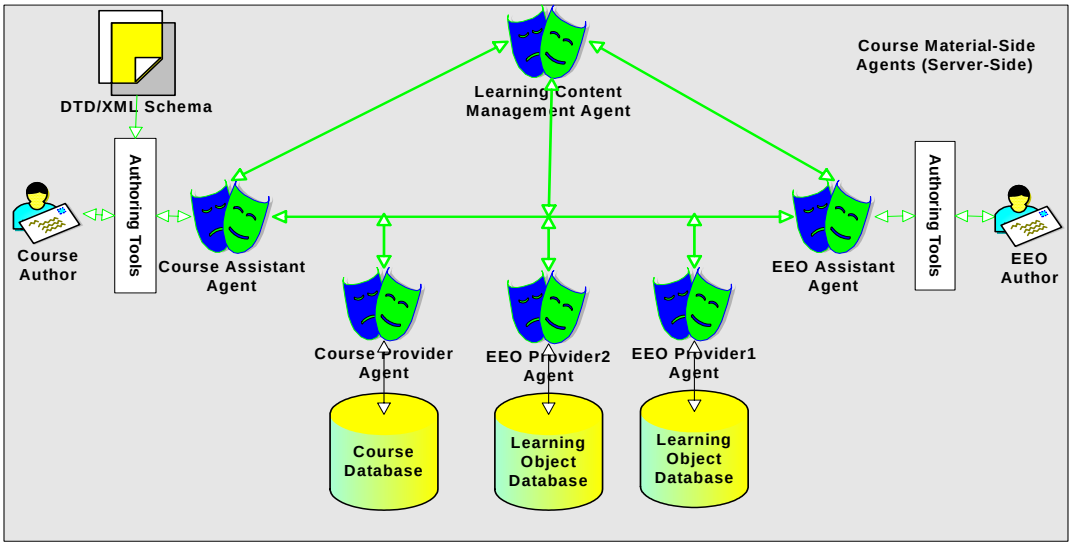

Figure 6. Architecture of agent enabled course authoring model based on learning object

Application scenarios

With MEEOCAS, several application scenarios can be easily applied, such as searching the appropriate EEOs, the subscription to LCMA and the negotiation between course and EEO developers etc. To save spaces, only one UML sequence schema, used to demonstrate the conversation protocols when searching an EEO, is given here. Figure 7 shows that course developers can search the EEOs that he/she prefers and subscribe to the LCMA when the search fails. These agents involved include CIA, CAA, LCMA, EEOPA and Federal LCMA. The detailed interaction steps are shown below.

- **Step 1:** course author states desired EEO as a goal to course interface agent; CIA may provide a particular form consisting of learning object metadata (LOM) to facilitate the course developer to customize his/her desired EEO (e.g., if the course developer needs such an EEO as Context='continuous formation', Interactive Level='middle', Difficulty='high', Keyword='agent, communication', Language='French', etc., s/he may fill out the ready-made form compliant to the IEEE LOM standard (2002) to customize his/her required EEO).
- **Step 2:** CIA sends an ACL message to CAA (note: the ontology of the ACL message is called 'EEO LOM Ontology' in MEEOCAS, which, in fact, is the LOM schema that represents the element concepts and their relations of LOM, and its content codec language may be XML or SL language).
- **Step 3:** CAA responses to CIA, which refers to the acceptance of CIA's request
- **Step 4:** CAA asks for help from LCMA that can identify whether there exist EEO provider agents providing such kind of service as described in the ACL message of CAA (note: in MEEOCAS, this CAA message applies a template to searching such service). In MEEOCAS, there maybe exist several LCMA agents that compose the federation

enabling the flexibility and distribution data storage. As such, when a local LCMA cannot find appropriate EEO providers, it can deliver the CAA's request to other federal LCMAs for help.

- **Step 5:** LCMA returns a list of names of agents that match the template, if no match is satisfied, LCMA sends a message inquiring whether CAA is willing to search further.
- **Step 6:** CAA agrees with LCMA.
- **Step 7:** LCMA asks for help from the federal LMCA agents
- **Step 8:** Implying that the federal LMCA agent has found the intended EEO provider.
- **Step 9:** According to the returned list of provider agents from federal LCMA, CAA sends corresponding ACL messages to all of the EEO provider agents, which first match the request with their own EEO metadata info. If these matches are satisfied, the locators (e.g., a URL or URI pointing to the desired EEO) will be sent to CAA. Or else, failed message may be presented to the course developer and CIA may inquire further whether the course developer is willing to modify his/her form or subscribe to such service from LCMA which will automatically notify CAA as soon as such service is available in MEEOCAS.
- **Step 10 and step 11:** Course assistant informs CIA to present the desired EEO with a XML type sheet to which the course developer prefers.
- **Step 12:** Once having accomplished a courseware by taking advantage of the template-based course authoring tools, course developer can store his/her works into the course repository. This process is performed through **step 13 and step 14.**
- **Step 15:** When a new course is stored into the course repository/database, course provider agent will register the new service to LCMA agent.
- **Step 16 and step 17:** Return the message of success registration.

Conclusions

This paper presented the architecture of a multi-agent based learning object and course authoring system. With the introduction of EEO into MEEOCAS, we can find out that it brings many advantages as follows:

- Course designers may conveniently develop their courses through assembling the ready-made EEOs instead of creating them from the scratch. It is sure that, when contributing courses to MEEOCAS, they could also make full use of the existing courses which contain well-organized and well-tagged EEOs provided by MEEOCAS.
- From the standpoint of EEO designers, it is convenient for them to create EEOs adapting to corresponding templates in accordance with an appropriate taxonomy, and to update the old version of EEOs according to the feedbacks from all the other actors (e.g. teachers, course designers, learners or the agents in MEEOCAS). In addition, EEO designers can also formulate different EEOs satisfying diversified levels of learning objectives by inheriting, modifying and reassembling the existing EEOs.
- From the perspective of teachers, they could take advantage of these ready-made EEOs and courses to organize their teaching process or offer learners some recommendations of useful learning recourses during their interactive pedagogic activities.

- As far as learners are concerned, in MEEOCAS-enabled environment, they may choose among several available learning patterns (e.g. course-oriented learning, EEO-oriented learning, self-paced learning, teacher-centered learning or collective learning pattern etc.). In converse, the feedbacks from learners are also important references for course and EEO designer to modify and improve their works.

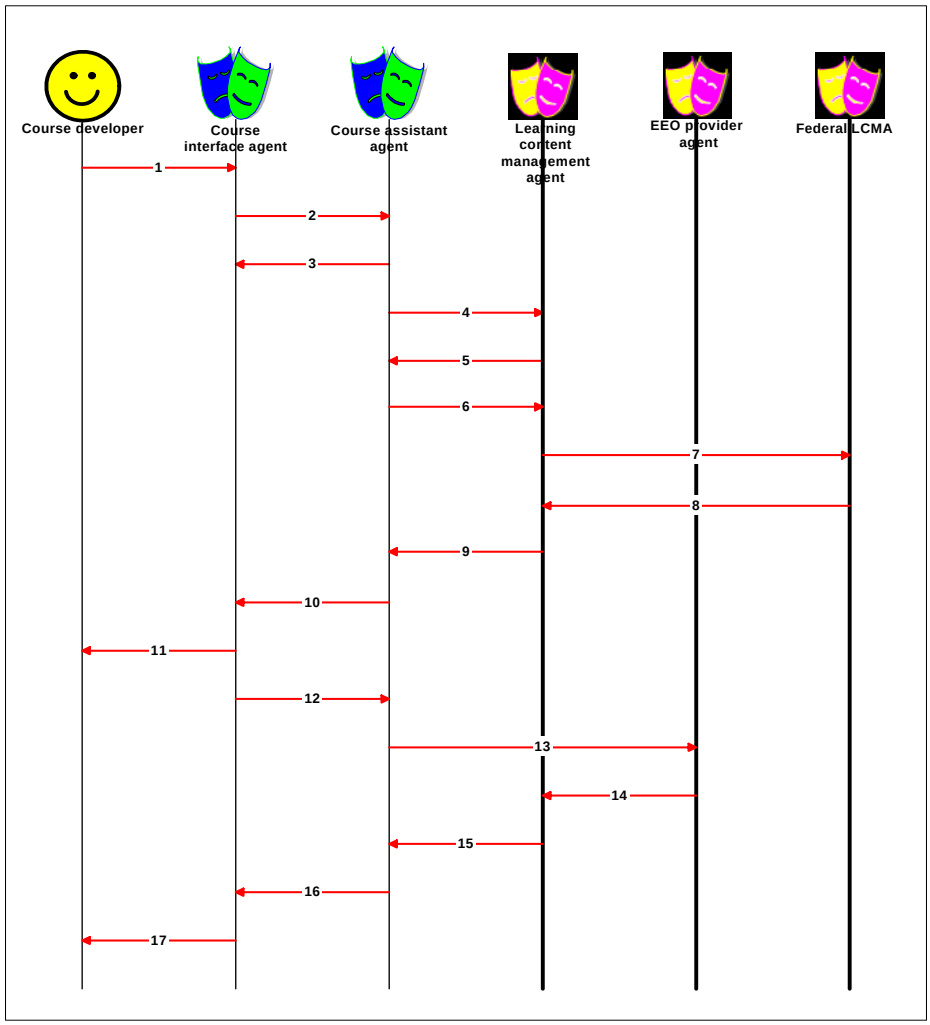

Figure 7. UML sequence schema of searching target EEO

Despite these potential advantages of EEO, it is still difficult to make them function without a flexible supporting environment. Just because of the incorporation of agent technology in MEEOCAS, which makes possible to provide a common channel for the communication, cooperation and negotiation among all the agents. As such, it is convenient to deliver and handle EEOs throughout MEEOCAS with the help of relevant agents.

For MEEOCAS, it not only facilitates the development of courses and EEOs, but also, when applying MEEOCAS to the whole e-education system, makes easy to personalize the learner's learning process and diversify their learning styles because of the wonderful features of EEO and agent. With the advancement of multi-agent and Internet technology, it is believed that similar systems dedicating to the development of e-education resource library will surely be emerged more and more.

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Editor's Note: This pilot study shows a relationship between participation in web forums and final letter grades. It also suggests that the web forum supports learning better than other forms of electronic messaging such as email. Additional research is needed to provide conclusive data about asynchronous communication tools for learning.

Online Writing as an Indicator of Student Performance

Michael K. Barbour and Michael A.J. Collins

Abstract

In this paper, the authors consider student use of a web-based discussion forum in a second year, non-major Biology course. The authors discuss how meaningful participation in the forum is a form of public writing and may be an indicator of overall student success in the course. The authors also discuss how this success in the course is not tied to the students' previous performance at the post-secondary level.

Keywords: computer mediated-communications, web-based discussion forum, electronic messaging, student achievement, student performance, technology integration

Introduction

Over the past decade, the researchers have been investigating the effects of student participation in electronic messaging (i.e., electronic mail, asynchronous discussion forums and instant text messaging). This investigation has evolved as both the technology has changed and the research trends in the field have adjusted to reflect both these new technologies and current theories behind learning in technology enhanced environments. As the focus of this investigation has evolved, it has settled on the question of whether students' participation in a web-based discussion forum has an effect on their final course grade.

In this article, the researchers review the evolution of this study over the past decade, tracing the changes in both the technology and the researchers' own thinking. They also explore the question of whether the nature of student participation in a web-based discussion forum, accounting for the individual abilities of the student, play a role in overall student performance in the course.

Literature Review

Berge and Collins (1993) indicated that the main benefits of web-based discussion forums were the convenience for students, the time and place independence that it created for students, and the potential for students to become part of an online learning community. In addition to these primary benefits, there has also been considerable research into whether or not students participation in asynchronous means of communication, such as electronic mail and web-based discussion forums, have an effect on students' performance.

In 1989, Slovacek reported that

> *there appeared to [be] a positive correlation between students' use of e-mail to augment normal in-class communication with their instructors and final course grades [specifically] that each e-mail message initiated by the students was associated with a 1.781 point increase in final course grade on average (pp. 113-114).*

Conversely, Collins (2000a) reported little difference between the final course scores of e-mail users and non-users. However this same study showed that there was a positive relationship existed between the level of Web forum use and final course scores.

This distinction may be explained by Piirto (1998), who reported that approximately half of the students surveyed responded "never" or "not often," when asked if they proofread and/or edited their electronic mail. This was compared to 90% of students who responded that they proofread and /or edited their written documents "every time" or "most of the time." (p. 28) According to Piirto, the level of care that university students place into their composing of an electronic mail message was very low. This was supported by Collins and Barbour (2001a), who speculated that while e-mail messages are often short messages about non-content queries which are "private" and only for the instructor's eyes, postings to the Web forum are "public" and open to the scrutiny of all class members. Students are more likely to be careful and deliberate about what they write on the web forum because they are for public consumption (p. 8).

The careful and deliberate writing by students having an effect on student performance is supported by Ambron (1987), who reported

> *student response [was] extremely favourable; … most mentioned the value of writing in helping them understand [the subject.]" (p. 266). Moore (1993) reported that "learning improves … when writing assignments are complemented with instruction about how to use writing as a tool to learn [a subject.] (p. 217).*

In addition, Chickering and Gamson (1987) reported that one of the seven principles for good undergraduate education was that students "must talk about what they are learning [and] write about it" (p. 5). They also detailed that interaction between students and the professor and between students and other students is a key mechanism in enhancing learning. This is further supported by Moore (1994), who reports that

> *asking students to write is an effective way of making students think because writing involves more than putting down what's already in your head. Rather, writing is a powerful tool for learning because it helps you discover, develop, and organize your ideas (p. 290).*

Many of the advocates, like Moore, claim that student learn as they write, that ideas form as pen hits paper and that writing about a subject is a way of knowing the subject because writing creates meaning.

This line of inquiry is supported by the research into microthemes. "Microthemes are a special kind of student writing whose length is strictly limited, usually to 150-400 words" (Collins, 2004, p. 7). These written assignments have been used in many larger undergraduate classes in the hard sciences. "Microthemes are marked for their ideas rather than their grammar and spelling" (Collins, 2004, p. 7). Over a four year period, Collins (2000) found that there was an overall mean gain of 0.67% in student scores between those students who completed microthemes and those students who completed a term paper. However, the average test scores of students who completed 9-11 microthemes was 13.2% higher than the average test scores of students who completed only 1-6 microthemes.

The Study

The courses considered in this study are Biology 2040 – Modern Biology and Human Society I (Human Biology) and Biology 2041 – Modern Biology and Human Society II (Environmental Science), large enrolment second-year, non-major Biology courses which were regularly offered in on-campus lecture, off-campus correspondence and Web-based formats. During the period 1994-2001, student contributions to a discussion forum and e-mail messages sent to the instructor were collected.

This study initially began as a professor "searching for a way to improve student-student and student-professor interaction in a large second year biology course… [that had] increased from 40, when [he] first taught it, to over 170 students in the 1995 winter semester" (Collins, 1995a, p. 1). The first system that was utilized for this project was a text-based environment, "DEC Notes would allow students to post and reply to notices, or to just read notes and their responses, although they could still contact [the professor]" (Collins, 1997, p. 189). Research into this system was focused upon how the students used the bulletin board, considering many of the variables raised by Berge and Collins (1993). For example, Collins (1995b) stated that one of the perceived benefits of the system was "its availability around-the-clock so that students can ask questions, make comments, etc. at any time that suits them rather than having to wait for class or an opportunity to talk to the professor" (p. 189). Collins (1998) reported that "two thirds of the student use was for on-going discussions of a variety of topics such as the ethics of genetic engineering, the right to die, AIDS and youth, and the Red Cross and blood donations" (p. 80).

Collins (2000b) marked the next phase of this study, when the authors began to consider the effect of participation in the Web forum upon a students' performance in the course. "There [did] not appear to be a relationship between e-mail use and final course score" (p. 7). However, there appeared to be a positive relationship between Web forum use and final course score. Collins and Barbour (2001b) reported

> *only 'A's were very frequent users, and only 'A's and 'B's were frequent users. Only about one-third of 'C's, 'D's and 'F's were infrequent users while two-thirds made no use of the Web forum. Students achieving an 'A' in the course were much more likely to be Web forum users (21 of 42) than 'B's (12 of 29), who, in turn were more likely to be users than 'C's, 'D's, and 'F's (only 7 of 20) (p. 7).*

This relationship was further explored in Barbour and Collins (2002a, 2002b, & 2003a).

However, this exploration led to the question of whether "higher levels of motivation or scholastic achievement may also lead some students to participate in electronic messaging more than others" (Althaus, 1996, p. 14). It also presented another "question of whether it is the act of writing which accounts for this enhanced learning or whether that interaction is meaningfully based upon the content area" (Barbour & Collins, 2004).

Data and Findings

Earlier studies have indicated a relationship between frequency of use of the web forum and final letter grade, as is summarized in Table 1.

Table 1

Frequency of use of the web forum and final letter grade from 1997 academic year

	Course grade				
Level of use	A	B	C	D	F
Very frequent	2	0	0	0	0
Frequent	1	2	0	0	0
Infrequent	18	10	4	1	2
None	21	17	7	2	4
Totals	42	29	11	3	6

However, this still does not address the question of whether it is interaction or the act of writing which accounts for this enhanced learning or should that interaction be meaningful based upon the content area. In order to answer the above question each student message was assigned a value based on the following scale.

0 – No content basis

1 – Administrative

2 – Content-based question or message

3 – Content-based question or message with brief explanation

4 – Content-based question or message with substantial, but incomplete explanation

5 – Content-based question or message with complete or near complete explanation.

For this analysis, it was determined that the Spring 1999 semester of Biology 2040 was the only class that had enough messages to provide an adequate sample for this scale to be utilized effectively.

While, the vast majority of messages that were posted to the web forum were rated in the lower three categories, with approximately 55% of the posts being assigned a rating of 0 or 1, there were five posts assigned a rating of 4 or 5. The majority of the messages analyzed were of an administrative nature, such as questions about the timing or format of assignments or exams, however, 46% of the messages did have some content-basis (i.e., were rated 2 or higher). When the scale value for each message is averaged on a student by student basis (e.g., Student 11 posted eight messages which were rated 2/4/2/2/1/1/3/1 and would fall in the 1.51-2.00 range as the average value of these messages is 2), the following results are obtained.

Table 2

Value of use of the web forum and final letter grade

	Course grade				
Value of use	**A**	**B**	**C**	**D**	**F**
2.01 - 2.5	1	0	0	0	0
1.51 - 2.0	3	2	1	0	0
1.01 – 1.5	1	0	1	1	0
0.51 – 1.0	2	1	2	0	0
0 – 0.5	0	0	0	0	0
Didn't use web forum	1	3	0	0	3
Totals	8	6	4	1	3

This table indicates a similar pattern to the one found earlier by Barbour and Collins (2003b). The only student who had an average message value of higher than 2.0 scored an "A" in the course. The majority (5 out of 6) students who had average message values of 1.51 to 2.0 scored an "A" or a "B". The only students who scored an "F" in the course did not use the web forum at all.

The next data set addresses the issue raised by Althaus (1996), whether students do well because they participate more in the Web forum or whether stronger students are simply the ones who participate the most in the Web forum. The table below provides the difference between the

student's overall average at the university and the student's average in the course based upon their level of participation in the Web forum.

Table 3

Students mean adjusted score based upon level of web forum usage

Level of web forum usage	Number of students	Mean Adjusted Score
None	8	-1.99
Low	7	+0.10
Medium	4	+8.25
High	5	+15.40

As is indicated in the table, the eight students who did not use the Web forum at all had an average in Biology 2040 that was 1.99 percent less than their overall university average. However, the five students who were high users of the Web forum had an average in Biology 2040 that was 15.40 percent higher than their overall university average.

Barbour and Collins (2003b) "indicated that there existed a positive, but not conclusive, relationship between the number of times students posted to the Web forum and the grade that the student received. This study has found similar results, not solely based upon simply interaction, but on meaningful, content-based interaction." The data presented above illustrates that in addition to there being a positive relationship between students' meaningful content-based participation in a Web forum and their final course grade, the relationship does not appear to be dependent upon the students' higher levels of motivation or scholastic achievement. This analysis is also supported by the findings of Wu and Hiltz (2003). Wu and Hiltz found that "students felt that they learned a great deal from their peers through online discussion… [and that] online discussion increased their learning quality" (p. 691).

Conclusions

Initial studies into the relationship between students' participation in electronic messaging and students' final course grades indicated that there was a positive relationship between participation in the web forum and final course grade, but no relationship between the use of e-mail and their final course grade. Later studies found that it wasn't simply participation in the Web forum, but meaningful content-based participation that also showed a positive relationship to students' final course grades. Based upon these findings, the researchers speculated that the public act of writing in a web-based discussion forum had a positive affect on student performance.

The data presented in this article indicates that in addition to these earlier findings, the researchers speculation appears to be correct, in that students do well because they participate more in the Web forum, as opposed to the notion that stronger students are simply the ones who participant the most in the Web forum. However, it should be noted that from five years, representing dozens of classes, there was only one class in which there was enough student participation in the Web forum to conduct this analysis. In addition, this one class only represented twenty-four different students (compared to the over one thousand students who have taken Biology 2040 or 2041 during the period studied by the researchers).

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Editor's Note: This study determines how instructors use technologies in online courses based on their perceived importance and skill in application. It has specific data to compare relative values of asynchronous discussion, audio/video and real time chat.

Faculty Use of Technologies in Online Courses

Shijuan Liu

Abstract

Compared to courses delivered in the face to face setting, courses delivered entirely online rely more on technology. This study investigated the current state of faculty using technologies in online courses. Three technologies were examined in depth: asynchronous discussion, real-time chat, and audio/video. The following issues were investigated: how the technologies were used, how the instructors perceived the importance, necessity, and effectiveness of these technologies, and how skillful they were in using the technologies. The School of Education of a large Midwestern university in the United States was selected for the study. All the 30 instructors teaching online courses at the school were invited to participate in the study. Quantitative and qualitative data were collected through an electronic survey that consisted of closed-ended questions as well as a number of open-ended questions. .Findings of the study and implications for tool developers, university administrators, and instructional and technical support staff were discussed.

Keywords: use of technology, faculty, online courses, synchronous discussion, asynchronous discussion, real-time chat, audio/video technology, skills, importance, necessity, tools, implications.

Introduction

Compared to courses delivered in the face to face setting, courses delivered entirely online rely more on technology (Bonk, 2001; Firdyiwek, 1999; Moore, 2003). Technology, especially the Internet, provides a common virtual space for students and instructors who are physically separated; it is widely acknowledged as an essential component of teaching and learning environments in the online setting.

As more and more technology tools become available for online education, there is an increasing interest among educators and other professionals in application of the tools in online courses (Hanna, 2003; Moore, 2003). Some researchers (e.g., Ansorge & Colley, 2003; Carmen & Haefner, 2002) argue that such technologies as asynchronous discussion board and real-time chat have potential to transform teaching and learning. At the same time, researchers realize that these technological tools, like other tools human beings developed, can be used in profound as well as very trivial and careless ways in educational practice (Althauser & Matuga, 1998; Ottenhoff & Lawrence, 1999).

Faculty members play a key role in using technology successfully in online courses (Garrison, Anderson, & Archer, 2003; Willis, 1994), and their participation is believed to be inseparable for successful online programs (e.g., Schifter, 2004).

What is the current state of faculty using technologies in online courses? As many researchers (e.g., Bonk, 2001; Garrison et al, 2003; University of Illinois, 1999) point out, there is a pressing need to study this question. Answers to this question will help tool developers, instructional designers, instructors, and administrators in making decisions for their products, practices or services.

However, literature indicates that our understanding of the question is very limited (Garrison, et al, 2003; Zhai & Liu, 2005). Among the few available studies that investigate the question (e.g., Bonk, 2001), none of them are found to examine the question from different aspects in depth. This study attempts to make contribution to this area. Following aspects concerning faculty use of technologies in online courses are studied:

What technologies are used by the online instructors, how do they use the technologies, in which way and for what purpose(s)? How do the instructors perceive the importance, necessity, and effectiveness of the technologies they used in supporting their teaching and student learning? What new features do they expect the tools to have? Are their skills of using the technologies related to their perceptions of and the way they use the technologies?

Due to the plethora of available technologies, this study focuses on three important technologies in online courses, namely, asynchronous discussion, real-time (synchronous) chat, and audio/video. Other technologies and features such as teamwork, survey function and control of sharing level are also included this study but will be discussed in another paper.

Literature Review

Asynchronous discussion, also known as asynchronous communication, threads discussion, and delayed computer conferencing in the literature, has been used for over a decade (Garrison et al, 2003). It is argued to support greater independence and flexibility from temporal and geographical barriers (e.g., Feenberg, 1989), provides more reflective participation (e.g., Zhu, 1998), and helps students master content and develop their collaboration and critical thinking skills (e.g., Duffy, Dueber & Hawley, 1998). Literature shows that asynchronous discussion can be used in following ways: general discussions, exchanging ideas, working on specific topic areas, and peer commenting (Kang, 1998; Siegel & Kirkley, 1998). Duffy, Dueber and Hawley (1998) criticize that "many designers of conferencing systems have had a simplistic view of discussion as simply talking" (p.74), and argue for a more effective and pedagogical-based conferencing system to support online asynchronous discussion.

Real-time chat is known as synchronous discussion or synchronous communication. Unlike the delayed exchange (asynchronous discussion), real-time chat provides "teachers and students with a forum for an immediate and dynamic interchange of ideas" and "can be an exciting asset to collaborative learning environments" (Cooney, 1998. p.263). It can be used to foster group cohesion and decision making, brainstorming, and build high levels of socialization (Garrison et al, 2003; Kang, 1998). However, researchers (e.g., Zhai & Liu, 2005) find that real-time chat is used far from its full potential in some online courses.

Online courses are short in human communication compared to face-to-face courses from the viewpoint some online instructors and students (e.g., Bonk, Kim & Liu, 2005; Schifter & Monolescu, 2004). Audio and video technologies are argued to help humanize the content delivery of online courses and make learning more engaging and sustainable (e.g., Lee, Tan & Goh, 2004). Audio technologies can be used in such ways as prerecorded lectures, interviews with guests, and sound bytes of content relevant to the course study (McGreal & Elliott, 2004). While video technologies can help alleviate the "page-turning" boredom of online course, researchers find that they are not well utilized yet (e.g., Teng & Taveras, 2004). The stiff "talking head" of the instructor located at the corner of the course website is the image that quickly comes in one's mind when one considers the use of video technologies in current online courses.

Method

The School of Education (SoE) of a large public university in the Midwestern United States was selected for the study. Like many other schools, the SoE started to offer distance education courses in the form of correspondence courses. Its first online course was offered in 1995. Up to date, the SoE offered two masters programs, some professional development courses and undergraduate courses.

Participants

Thirty instructors teaching online courses in the SoE during the period from spring to fall of 2003 were invited to participate in the study. Twenty-two of them taught courses for masters programs, and eight taught professional development courses or undergraduate courses.

Instrument

An electronic questionnaire was employed in the study. The questionnaire was comprised of ten sections, including asynchronous discussion, real-time online chat, audio/video, survey function, and control of sharing level, etc. A five-point scale was utilized to ask the participants to rate the importance and the effectiveness of the technologies and features they used, and their skill levels in using them. In addition to the close-ended questions, eleven open-ended questions were included in the survey. The open-ended questions were intended to investigate reasons behind the participants' responses to the close-ended questions, and collect data that were difficult to be collected with close-ended questions.

Procedure

The contact information of the 30 instructors was collected from the websites of the course(s) they taught. The questionnaire was sent to the instructors as an e-mail attachment in October of 2003. In the invitation e-mail, the purposes of the study were explained. To improve the survey return rate, the e-mail was personalized as much as possible. For instance, each of the participants was addressed by their name (i.e., Dr.xx, Prof. xx). The course the participant taught was also mentioned. The participants returned the survey via e-mail. Most participants returned the completed surveys the same day or the second day that the survey was sent out. A thank-you e-mail was sent to each respondent right after the completed survey was received. Some respondents were asked to elaborate some points they made by follow-up e-mails.

Data Analysis

Responses to the close-ended questions were analyzed by SPSS. Percentage, mean, and standard deviation of individual items were calculated. Correlations between or among some relevant items were also examined. Data collected from the open-ended questions were analyzed manually. The frequency of each emerging theme was counted, and the representative quotations of the respondents were selected.

Results

Twenty out of 30 participants completed the survey with a response rate at 66.7%. Among them, thirteen were females. Seven were males. Fifteen taught graduate courses, and five taught undergraduate courses and professional development courses.

Ninety percent of the respondents were found to use the course management systems (CMS) that the university provided, namely, SitesScape Forum (SSF) and Oncourse. Only five percent did not use the CMS, but the Bulletin Board System (BBS).

Asynchronous Discussion

Respondents were asked to rate the importance of using asynchronous discussion in online courses with a five-point scale (1 = lowest importance, 5 = highest importance). Whereas 5% of the respondents rated the importance as the lowest, 70% of them rated it as the highest. On average, the respondents perceived using asynchronous discussion as being important or very important in online courses (M = 4.4, SD = 1.4).

Respondents who used asynchronous discussion in online courses described the way they used it. Their responses were listed according to the frequency of the themes from high to low:

- Students shared their reading reaction, experience, and got support from peers and mentors/instructors;
- Instructor assigned roles (facilitators/leaders and wrappers/summarizers, instigators, devil's advocate) to students; word count for the discussion;
- Instructor raised some discussion questions, students responded to the questions and responded to each other;
- Peer-review posted projects and assignments;
- Students posted their reading reaction first, then were responsible for responding to a certain number of their classmates' postings;

Students discussed in teams of 4 or 5 at the end of the discussion period; each team posted a summary of their discussion to share with the whole class. The duty of facilitator rotated among the team members. Students completed peer evaluations on their peer performance. The instructor monitored the discussion and added occasional comments, especially if s/he thought they were getting off track.

Participants were asked to rate the effectiveness of the tool(s) that they used in supporting online asynchronous discussion with a five-point scale (1 = least effective, 5 = highest effective). Results showed that none of the respondents rated the effectiveness as the lowest, while 44.4% of them rated it as the highest. On average, the respondents believed that the tools they used were effective (M = 4.11, SD = .96).

Participants were surveyed on what new functions that they would like the tool(s) to have and which suggestions they might have for improving the tools they used. Their responses could be divided into two categories: (a) pedagogy related, including ability to hide posts until a student posts his (to ensure the first-level postings are original, not borrowing from others); ability to hide/change name for anonymity in discussions periodically; ability to easily create discussion group space; track of read and unread messages well; automatically formulate folders instead of thread; and ability to support graphic and video; (b) usability related, including ability to recall, delete, edit one's own messages; ability to simultaneously view the posting to which one was replying; better threading of the discussion; a more user-friendly interface design; and easier printability and navigation.

Real-time (synchronous) Chat

Real-time chat tools that the respondents used included: Tapped-in, AOL instant messenger, MSN messenger, SchMooze, and the chat function supported by the CMS (i.e., SSF or Oncourse).

When asked about whether it was necessary to use real-time chat in online courses, 30% said "no"; 25% said "yes"; 25% of the respondents said it could be beneficial, but had some problems; 15% said it would depend on the characteristics of students, instructional goals, and technology consideration(s); 5% indicated that she did not know because she had not used this before.

Reasons that the respondents gave for why it was necessary to use could be put into two categories: (a) students felt more comfortable since real-time chat was more informal; it brought in some authenticity and helped build a sense of community; and (b) it was efficient to use real-time chat to communicate and give immediate feedback.

Problems and concerns that the respondents who held a negative or neutral position in using the real-time chat were listed as follows based on the order of the frequency from high to low: (a) it was difficult to arrange for both instructor and students because students were from different time zones and had different schedules; (b) asynchronous discussion was more important because it forced students to reflect more and provide them more time flexibility; (c) it would take away one of the advantages of taking online courses; and (d) it would be an unreasonable burden for students.

Respondents who reported that they used real-time chat in their online courses described the way they used it. Their responses were listed according to the order of frequency from high to low:

- Had students share their ideas for their own or group project and get feedback from the instructor and peers;
- Had students visit virtual environment to explore possibilities of use in their [student]teaching
- Used Instant Messenger for office hours: Students can "pop in" to ask questions; and see when students are online and remind them of things
- Used for interaction with a guest speaker;
- Introduced everyone to each other at the very beginning of semester, and to answer any concerns that have come up in terms of using the tool;
- Used for unit wrap-ups, discussed the main topics of that week, and clarified assignments;
- Used for readjust course schedule; and
- Used for personal communication.

Participants were asked to rate their skills of using real-time chat with a five-point scale (1 = lowest, 5 = highest). Two respondents did not answer the question and indicated that they had not used the real-time chat and would not consider using it in the future. Among the other eighteen respondents, 33.3% of them rated their skills as lowest, while 27.8% of them rated their skills as highest.

Audio/Video

Participants were asked whether it was necessary to use audio/video in online courses and why they thought that way. Only one respondent said "yes". The reasons he stated were as follows:

It helps enhance the authenticity of a learning environment and create a psychological proximity in the geographically distributed learning community. In addition, both audio and video can enhance students understanding for learning concepts and principles, which is otherwise explained through heavy text. As the majority of the students had high-speed connection, downloading was not an issue.

Twenty percent of the respondents chose "no". The reasons given included: "Current resources (without using audio/video) are sufficient and effective 'in supporting students' efforts to meet course objectives;" "Audio did not add much to course management, Asynchronous conferencing has, as literature also tells us, advantages and that is good enough (reflective & critical thinking, etc.) for my purposes of attaining high-level learning;" "Many people like anonymity."

Thirty percent of the respondents believed it would depend on the course content, students (needs), instructor, circumstance, etc. As one of the respondents said,

> *In my classes, I don't really think it is necessary. But for other online courses that gear toward multimedia design and other visual/auditory-oriented subjects, audio/video supplement might be helpful.*

Forty percent of the respondents believed that it was not absolutely necessary, but it could be useful, fun, and could increase class interactivity, etc. In the words of one respondent: "It's not necessary, but it can be a useful tool…. some things are easier to show in a video clip, for instance, than to describe in words." The other respondent (5%) said he did not know because he had not used audio/video in online courses before.

Participants were asked to describe the way they used it and their students' responses to it. Five respondents answered this question but only three mentioned students' responses. One respondent reported that she used a stream video related to interviews with online teachers and students that the course needed. According to her, students really liked it, but she had to send students a CD ROM via snail mail because about one-fourth of her students had technical problems in accessing it. Another respondent said that he used audio and video clips as examples since the course was about multimedia production, in which students were required to make audio and video clips on their own. However, he was not sure whether students liked the clips or not. Still another respondent reported that he created an audio clip of lecture. He had assumed that audio would be more interesting than reading a long document; however he was surprised when some students complained that they were visual learners and the clip did not have visual elements.

Participants who had not used audio/video in their courses were asked whether they would consider using it in the future. 42 % respondents said "yes" for the reason that it could enhance learning and enrich the online classroom to meet the learning styles of different students. One of them said that she would have to learn how to use it if it was indeed proven useful. 16.7% said they would not consider using it in the future. The rest of the respondents reported that whether they would consider using it depended on students' needs. As one of them said, "It would have to really be worthwhile for me to use it, rather than a high-tech option."

Discussion

As reported earlier, almost all the respondents in the study were found to use course management systems in their online courses. This finding was consistent with what other studies found (e.g., Bonk, 2001; Teles, 2002). It also added empirical data to the literature that CMS has become mainstream practice in online courses (e.g., McLoughlin & Luca, 2000). The popularity of CMS indicated that tool developers, university administrators, instructional designers, and technical support staff would need to continuously improve the functions of CMS or provide technical and instructional support for using it.

Asynchronous Discussion

There was a high consensus among the respondents concerning the importance of using asynchronous discussion in online courses. Eighty-five percent of them perceived it as the most important or very important. This finding was consistent with the relevant literature (e.g., Bonk, 2001; Bonk & King, 1998; Garrison et al, 2003; Teles, 2002). How the respondents used it such as assigning students different roles for weekly discussion, and asking students to facilitate the discussion in teams aforementioned was also supported by the relevant literature. This finding indicated that most instructors became familiar with using asynchronous discussion and were relatively skillful in using it.

It is worth noting that at the present time some conferencing systems have developed a number of pedagogical features suggested by Duffy et al. (1999). For instance, SSF enables instructors to

track each post and see who has read it, thereby providing them with yet another index of student's participation. The respondents in the study, on average, believed that the current asynchronous discussion tools were effective in supporting their teaching. However, based on the respondents' suggestions it still seemed to be a need for the designers and developers to further improve the tools in both pedagogical and usability aspects.

Real-time Chat

Consistent with literature, the importance of using real-time chat including helping build a sense of community and giving immediate feedback efficiently was acknowledged by some respondents. The way how they used it was also consistent with what the literature suggested (e.g., Kang, 1998). Such strategies reported by the respondents as using it for office hours and interaction with a guest speaker indicated that some online instructors were able to use the technology in a very thoughtful and effective manner.

However, two-third of the respondents held a neutral or negative position on using it. The problems and concerns that they listed (e.g., hard to arrange because of different time zones and schedule) were reasonable. There are at least two things that administrators, instructional designers, and support staff members can do regarding helping online instructors to take advantages of using real-time chat. One is to help them realize what the advantages are; another is to provide them with strategies on how to tackle the problems and concerns in using it.

In addition, the finding of the study indicated that lack of skill and experience was another barrier for the instructors who did not utilize the technology well. Specifically, the respondents who rated their skills as the lowest were also those who had not used it. This further proved the need to expose the instructors to how to use the real time chat technically and pedagogically.

Audio/video

As aforementioned, among the 20 respondents only one chose "yes" when asked about the necessity of using audio/video in online courses. This indicated that the advantages of the technology seemed not to have been widely acknowledged. In addition, the technology did not seem to be utilized to its best capacity. For instance, Kirschner (1991) found that using audio clips as one way to give feedback to student took less instructor time and was perceived as being of higher quality than text-based feedback. Among the five respondents who described the way how they used in their courses, however, none of them indicated that they used the technology to give feedback or communicate with students. The finding implied that, like in the case of the real-time chat, administrators, instructional designers, and other support staff members need to provide online instructors with more opportunities to realize the advantages of audio/video technology and to help them improve instructional strategies in using it.

It is worth pointing out that compared to their responses to real-time chat, respondents who had not used audio/video seemed to be more willing to consider using it in their courses in the future. When surveyed for what new features were needed to better support asynchronous discussion, one respondent specifically listed the ability to support video. This is consistent with what other researchers found. For instance, Garrison et al. (2003) argued that "as tools become more efficient and less costly and bandwidth becomes cheaper and more widely available," "most new computers come equipped with microphones and recording software, ad video recording systems can be purchased and install on newer computers for under $200," there will be "considerable value" in adding such multimedia technology to the CMS (p.119).

When compared the respondents' perceptions of the importance of the three technologies, asynchronous discussion seemed to be perceived more important than real time chat and audio/video technologies. The study also found that the respondents' perceptions of the importance or necessity were related to how they perceived the benefits (or advantages) and

challenges (or problems) of using the technology. Specially, the more benefits they perceived, the more likely they perceived the technology as important, and vice visa.

A positive correlation was also found between the perceived importance of the technology and how often the technology was used. Specifically, the more important of the technology was perceived, the more often the respondents tended to use it, and vice visa. Additionally, there was a positive correlation between the instructors' skills of using the technology and how likely they used it.

Conclusions

The study attempted to investigate the current state of how instructors use technology in online courses. Major findings include that asynchronous discussion was perceived as being very important or necessary to be used in online courses; while audio/video and real time chat were perceived as less important or less necessary. How the instructors used the technologies in their courses was reported and connected to the relevant literature. Positive correlations were found between the instructors' perceived importance and necessity of the technology and how likely they used it, between their skills of using the technology and how likely they used it. The findings of the study help add empirical data to the relevant research, and are expected to help online administrators, instructional designers, instructional and technical support staff, and tool developers with developing better tools, offering appropriate workshops, and providing corresponding support.

Limitations of the Study

The study had two major limitations. First, while the selected SoE was representative of the schools of this kind to some extent, this cannot warrant that the online courses it offered represent those offered in other institutions. Therefore, readers need to be cautious when making generalizations of the study findings. Second, even though the questionnaire was reviewed by three experts and tried out by two associate instructors before it was sent out, there was still room for improving it. For instance, a couple of respondents pointed out that some items of the questionnaire were not very specific to them.

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Editor's Note: We usually think of Stephen Downes as a philosopher, scholar, and editor of OLDaily, a rich source of current information and blogs related to teaching, learning, technology, and whatever else is important for education and training. We accept as normal his professional five-day-a-week newsletter and resource-full (sic) Web Page. This article is one of his more down-to-earth essays about something 0f special importance for teachers, learners, and editors of websites.

Tutorial Paper

Principles for Evaluating Websites

Stephen Downes
July 16, 2005

How do you know whether something you read on the web is true? You can't know, at least, not for sure. This makes it important to read carefully and to evaluate what you read.

This guide will tell you how….

1. There Are No Authorities

Authorities used to be people you could trust. When you read it in the newspaper, for example, it was probably true. When a scientist reported a finding, you could count on it. But today, you can't trust the authorities.

Why not? There are many reasons, but here are some of the major ones:

- Authorities lie. Not all authorities, and not all the time, but frequently enough to mean you can't simply trust them.
- People impersonate authorities. A site may look like a newspaper or a government publication, but it might not be.
- Authorities are sometimes fooled. They may rely on bad data. They may be reporting something they heard.

Even if you trust the authority you are reading, you need to evaluate what they say for yourself. People don't always mean to mislead you, but they do.

This is the most important principle of reading on the internet. You must determine for yourself whether or not something is true.

2. What You Know Matters

If you saw the local grocery this morning, and then someone told you it burned down last night, you would know they were wrong because of what you saw. And you would probably say so.

You can depend on your own knowledge. And you should use this knowledge when you read websites.

That doesn't mean that you cannot be wrong. But most people don't give themselves enough credit. They are too quick to assume that they must have been wrong.

Your own experiences matter. If someone says some software is easy to install, and you found that it wasn't that easy to install at all, don't simply assume that you can't install software. If it wasn't easy for you to install, it wasn't easy, and someone who says it is easy is wrong.

3. Keep Count

You can't check everything for yourself. Eventually, you will have to depend on what other people say. You can't simply assume that what they say is true.

The key here is trust. You need to learn who to trust.

The way you learn to trust someone is through repeated contact. They not only say things you know are true, they don't say things you know are not true. You need to keep track of this for yourself.

When a website says something, you need to ask yourself, have they misled me before? Websites usually follow a pattern; sites that are trustworthy generally stay trustworthy, while sites that mislead you once will likely mislead you again.

That doesn't mean you never question what they say. Always check what they say against your own experience. But if you don't know, depend on the sites you already trust rather than the ones you don't.

4. Facts and Appearances

Many people are very careful appearances. Governments and businesses especially take great care to manage their image. Individual people, too, try to cast themselves in the best light possible.

They do this because people trust people who look good. Politicians always take care to dress nicely. Con artists are often dressed in suits. Businesses spend a lot of money to make their buildings and their websites look nice.

People create appearances in words as well. For example, they often use adjectives and adverbs to suggest how you should feel about something. They also use loaded terms to suggest that something is good or bad. Compare the following:

- "This respected software reliably saves your data in the most efficient format."
- "This suspicious software misleadingly saves your data in a common format."

The first software sounds a lot better than the second software. But in fact, they do exactly the same thing!

In your mind, remove the adjectives and adverbs from any sentence you read. Convert any loaded terms to neutral terms (for example, convert a sentence like "He claimed..." to "He said…").

In other words, practice distinguishing the facts in a sentence from how they appear.

You may be tempted to distrust things that use a lot of adjectives, adverbs and loaded terms. And certainly you should be suspicious. But sometimes people just write that way; it doesn't mean they're lying. And sometimes people try to fool you by writing in plain and straightforward language.

The main thing is, find the facts. You can check facts. And just ignore the appearances.

5. Generalizations Are Often Untrustworthy

When you look at facts, you will see that there are two types: specifics and generalizations.

- A specific is a statement about one thing, one person or one event. "John went to the store yesterday" is a specific.

- A generalization talks about a group of things, many people, or a number of events. "John always goes to the store."

People use generalizations because generalizations help them predict the future. If you know that John always goes to the store, then you can predict that he will go to the store tomorrow. Generalizations also often explain why something happens. John knows the shopkeeper because he always goes to the store.

There are two types of generalizations:

- A universal generalization talks about everything. When someone says "All dogs are animals", for example, they are talking about every single dog.
- A statistical generalization talks about a number of things, but not all of them. When someone says "Most dogs are brown," they are talking about a large number of dogs, but not all of them.

It is important to keep in mind that most universal generalizations are false. Not always – after all, it is true that all dogs are animals.

But people often make universal generalizations that are false. And in fact, when you read universal generalizations on a website, you should be very skeptical.

Watch for the following words: all, none, only, never, always, completely. And words that mean the same sort of thing. These indicate a universal generalization. When people use them, ask yourself, is this true? Are there no exceptions? And if you know that there are exceptions, then the source is less trustworthy.

6. Absolutes Are Hidden Generalizations

People often make generalizations without realizing that they are doing it. And they might fool you into thinking that something is a fact, when it is actually a questionable generalization.

"The Chinese cannot be trusted." This looks like a statement of fact, doesn't it? But ask yourself, how many Chinese people is this person talking about? All of them? Most of them? There are a billion Chinese – how could this person possibly know that they cannot be trusted?

And of course, they can't. You have no reason to trust such a statement. And a person who makes such a statement is less trustworthy.

7. Statistics Are Often Misleading

As the truism says, "There are lies, damned lies, and statistics." People are often skeptical of statistics, and for good reason. There are many ways statistics can be used to mislead.

Statistics must be based on data. For example, for somebody to say that "most dogs are brown" they would have had to go out and actually count some dogs to see how many of them are brown. Statistics that are not supported with data should not be trusted at all.

Even if there is data, statistics can still mislead. There are two major ways statistics can mislead:

- The sample size is too small. If you know five Americans, and four of them are crooks, is that sufficient to conclude that most Americans are crooks? Of course not. There are 330 million Americans; you need to meet more than five before you can start making generalizations.

- The sample is unrepresentative. If you wanted to know about Americans, and took your sample from a prison population, would you get a good result? Of course not – most Americans are not in prison, and are very different from prisoners.

Remember at the beginning of this article where I said that there are no authorities? When you look at the statistics produced by authorities, many of them break one of these two rules. What would you say about a scientist who surveyed 21 graduate studies and drew a conclusion about all people? Not much – but many papers that do exactly this are published.

Statistics are often misleading in ordinary writing as well. Often, they are disguised: a person might use words like 'most', 'often', 'many' or 'usually'. And their data will be suspect. A person might say, for example, "Most people are generous." How does he know? Because most of the people he knows are generous. But that's not good data at all!

Think about the generalizations you believe. Are they based on good data? What is the data? I said above that you should trust yourself – but you should always review your own beliefs, to make yourself more trustworthy.

8. Go to the Source

People say things about other things and other people. That's no surprise; you can't talk about yourself all the time. For example, a person might report about what someone else said, or about what some data shows.

They may not mean to mislead you, though sometimes they do:

- They might have misread or misunderstood the original document. Heck, I do that myself.
- They may have quoted something out of context. For example, I may have written, "If people vote the wrong way then we'll have private health care" and be quoted as saying "We'll have private health care."
- They may be misrepresenting the original. People sometimes pretend that someone said something that they didn't, so they can make the other person look bad (that's called a straw man).

When you read something you always need to ask, are they talking about something else and especially what somebody else said or reported. If so, go to the source to find out for yourself what the other person really said.

If there's no link or reference to the source, don't believe it. And even more importantly, websites that don't offer links or references are less trustworthy.

If you can't find the original source, try searching for the same information. Other people may have seen the same source and reported on it themselves. They may have described it differently. You may never know exactly what was said, but if people on different sides of the same issue agree on what was said, then it's more likely to be true.

9. Motives and Frames Matter

Most content on the web is trying to convince you that something is true. That's why it's on the web in the first place.

Usually, what they want you to believe isn't just some isolated fact or data, but rather a whole collection of facts and data. They want you to see the world in a certain way. In philosophy, this is sometimes called a 'world view' while in linguistics this is called a 'frame'.

Here are some examples of frames:

- It's a dangerous world and we have a lot to fear
- Microsoft products cannot be trusted
- Our country is the best (most free, most democratic, most advanced, etc.)

Think about all the sorts of things that could lead you to believe any of these three statements. Think about other sorts of things that might also be frames. Think about the way you look at the world – you probably view it from a certain frame, whether or not you recognize it.

That's not bad in itself – we all have to have a way of looking at the world. But we need to choose this way of looking at the world for ourselves. That's why we need to understand what frames other people believe, so we know when we are being persuaded to look at the world one way or another.

That's why motives matter. A person's motive is the frame or worldview he or she wants you to accept. You need to know why somebody is telling you something as well as what they are telling you.

Websites that hide their motives are untrustworthy. They are trying to convince you of something, but they are trying to do it in a sneaky way, so that you can't make your decision for yourself. They think that if you just hear something over and over, and it all points to a certain way of looking at the world, that you will start seeing the world that way too.

If a website is sponsored by the government, but they hide this sponsorship, then they are hiding their motives. If a study is financed by a software company, but this financing is not revealed, then they are hiding their motives. If a news site is secretly sponsored by a religious organization, then the news site is untrustworthy. If an activist group is funded by the industry they are trying to change, then this group is untrustworthy.

They are not untrustworthy because what they are saying is false. They are untrustworthy because they are not being honest about why they are saying what they are saying.

10. Beware Misdirection

Have you even seen a political ad for one candidate that talks about the other candidate? Have you ever seen an advertisement about one product that only talks about another product?

These are cases of misdirection – they are trying to get you believe one thing by talking about another thing.

Misdirection is very common on the web. Sometimes it consists of misrepresenting the source, as discussed above. Very often, though, it consists of merely attacking the source.

You see this not only on discussion lists (where it is very common) but also on personal websites, corporate websites, political websites and even academic websites.

If a website is trying to convince you to believe one thing but actually talks about another thing, then the website is not trustworthy.

Summary

As I said in the second point, determining what to believe – or to not believe – is a matter of trust. You need to determine for yourself who to trust about what.

This is something you have to determine for yourself. Each time you look at a website, think of yourself as keeping score. When a website does something untrustworthy, take some trust away. When a website does something well, add some trust.

And it's something very personal. The better you get to know a website, the more easily you can determine whether or not to trust it. The website gradually acquires a track record with you. Just like a friend or an associate.

And finally, this is something that works best if you use diverse sources. Try to read points of view from different frames – after all, every frame has an element of truth to it. Don't just go with the flow, be ready to challenge and question everything – even yourself.

Examples

40 Things That Only Happen In Movies

Should you trust this site? The title should let you know that this is intended as humour. But if not, you should be alerted by the universals in this title. They are probably exaggerating to make a point.

Look at some of the assertions. "(In movies) any lock can be picked with a credit card or paperclip in seconds." Well you know that this isn't true. People don't always pick locks in movies. Sometimes they can't even break the door down.

This site is funny. But you shouldn't trust it to tell you true things about the world.

Top Chinese general warns US over attack

This news article is offered by the Financial Times, a British news source with strong links to the British and American financial communities. The story reports that a Chinese general said that China would use nuclear arms if attacked.

Did the general say this? Probably. The general is named - Zhu Chenghu – and the place where he made the remark is also named - a function for foreign journalists (it would be better if they actually named the function and told us who else, in addition to the Chinese government, sponsored it). And a one-minute search in Google for 'Zhu Chenghu' links to other reports – from the BBC and the Times of India, for example – with the same information.

Is what the general said true? We have no way of knowing. Even the Financial Times article notes that Zhu is not a high-ranking official and that "Gen Zhu probably did not represent the mainstream People's Liberation Army view." Coverage elsewhere, for example in the BBC, reports that the Chinese government is 'downplaying" the remark.

So now the key question is, why did the Financial Times run the article? The article is intended to shape our views even if we cannot know whether what was said was true. Does it make us fear China more? Do the British and American financial communities stand to gain if readers fear China or become more concerned about nuclear war? Does this article fit a pattern in Financial Times coverage of China?

In my opinion, this article, although an accurate report, makes the Financial Times a bit less trustworthy.

Iraqis March Against Terror

This article is found in a blog titled BlackFive. It tells us that about 1000 Iraquis in the city Qayarrah, Iraq, marched against terror, and that “you probably haven't heard about it from Peter Jennings or Dan Rather.” The post includes a number of photographs of the demonstration taken by "Army Specialist David Nunn."

As one person commented, "Rather retired early in the year and Jennings has been off battling lung cancer for months." However, a search in Google shows that the protest was not covered by any major news outlet.

That a protest did happen seems evident from the pictures. Examination of the pictures, however, shows the banners to read "The juboor's tribe and its allies ask the coalition forces to release the highly-ranked officer Farhan Muthallak who was imprisoned by the coalition forces" in both English and Arabic.

A Google search for "Army Specialist David Nunn" reveals no citations not associated with this particular story.

This story is very untrustworthy. It reports a protest for one thing as a protest for something else. The source of the photographs cannot be verified. It attempts, further, to discredit the news media, thus engaging in misdirection. The site (and other sites, for many sites ran this item) is much less trustworthy as a result of running this item.

It is worth noting – as demonstrated in the trackbacks – that this story has been widely circulated. This is common, even for untrustworthy stories. That is why it is important to read, not only numerous source, but also diverse sources. And to check the data for yourself.

Again, one should ask why such a blatantly misleading story achieved such wide circulation.

Secure RSS Syndication

This site suggests that there is a need for encrypted RSS feeds and demonstrates how it is done. The need expressed is the author’s own, and two potential solutions are considered and rejected. The code used to generate the encryption is provided, along with samples of the encrypted data.

This article is very trustworthy. Very specific information is given, and in a form (via computer code) that can be directly verified by the reader. It should be noted that one argument ("Atom isn’t finished") will cease to be true at a future point; if you were reading this article after Atom is finished you would want to check to see whether it satisfies the need as well.

This article is supportive of the idea that encrypted content syndication is a good idea. This suggests that the author may have an interest in promoting commercial applications of content syndication. But such a conclusion should not be drawn without looking at a large number of other items written by the same author.

Bastille Day

This is a Wikipedia article about Bastille Day. Readers should note that Wikipedia articles frequently change. This article was current at 11:40 a.m. EDT, July 16, 2005.

The article begins, "Bastille Day is the French national holiday, celebrated on 14 July each year" and provides some background. This information can be verified from numerous sources using a quick Google search on ‘Bastille Day’. Much of the background and information is substantiated by other sources.

The article next contains the comment, "Margaret Thatcher once said of the French 'who can trust a people who celebrate, as their national event, a jailbreak'." This statement does not tell us about Bastille Day. It is derogatory to the French. The source of the quotation is not given. This

statement may be disregarded as vandalism. (It is worth noting that as of 11:47 a.m. the statement had been removed.)

This article, with the exception of the one item noted, is trustworthy.

The Price is Right pricing games

This is a Wikipedia article about The Price is Right. Readers should note that Wikipedia articles frequently change. This article was current at 11:51 a.m. EDT, July 16, 2005.

The article lists a number of 'minigames' played on The Price is Right. Each game is described, with in formation about when it was played, how frequently it was played, and records, if applicable. Three external sources, including one from CBS, the producer of The Price Is Right, and one with screen shots of the games, are provided.

Readers who have seen The Price is Right can verify the game descriptions for themselves from their own experience. From my perspective (having seen many of the games) this article is very trustworthy.

The Flight of the Bumblebee

This is a video of a person playing Flight of the Bumblebee solo on guitar. The video is sufficiently detailed to show the fingering. The sound is a guitar sound. The tune is recognizable as Flight of the Bumblebee (people who have not heard this piece of music before should consult alternative sources to verify the title).

This video is trustworthy.

About the Author

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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.

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