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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.

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Donald G. Perrin
Executive Editor

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Editorial

Cheating and Stuff!

Recently, I read Levitt and Dubner's book, *Freakonomics: A Rogue Economist Explores the Hidden Side of Everything*. In keeping with its outrageous title, it discovers statistical evidence to determine causal mechanisms very different to the common wisdom used to explain events. The authors used statistical evidence to debunk popular theories about abortion, crime and punishment, drug dealing, tests, and other social issues. They show how to detect cheating through statistics. Cheating is more common than most people realize, even among school teachers. They also showed how professions like insurance and real estate are impacted when their privileged information becomes freely available on the Internet.

> "It is common for one party in a transaction to have better information than another party. In the parlance of economics, such a case is known as information asymmetry. … But information asymmetries everywhere have in fact been mortally wounded by the Internet."(2005, Leavitt and Dubner, p 68.

Easy access through the Internet reduces the value of expert advice and results in significant savings for intelligent users. I recently paid thousands of dollars for expert advice only to find better advice on the internet with one keyword and two clicks. "Experts depend on the fact that you don't have the information they do."(p 70) My mind wandered to privatization of knowledge and damage to teaching and learning as a result of the Digital Millennium Copyright Act. . . .

The authors had me on a roll until they stated there was no improvement in student learning as a result of computers. When I calmed down, I realized that was true. What they really said was, *based on the standardized tests used by school systems for many years*, there is no measurable improvement in learning. Statistics will not point to the correct answers if they are based on old information or research questions that are not relevant. That is why this Journal exists to stimulate research, peer reviews and open publication of current knowledge that is accessible online.

"Information is the currency of the Internet." (p 68.) Sources of informed and current information are like a honey-pot to those who are curious and thirst for knowledge. For education, technology, and learning, Stephen Downes' *OLDaily* is a leader in reporting, commentary, and propagation of new ideas. *Itdl.org* knows when it receives mention in OLDaily by a rise in readership statistics. Blog sites in several countries have a similar though lesser effect. The informed community shares links and professors assign articles for readings, critiques and classroom discussions.

Itdl.org is an open site and the Universal Resource Locator address is displayed for each article. As a result, 80% of readers bypass index pages and go directly to the article. For our internal management and planning, we know how many page views occur for each article each month and the number of downloads of Acrobat files.

In 2005 there has been no promotion for articles other than *Call for Papers* on the home page. They just come. The Journal is upgrading the peer review process to protect your future status and ours with academic Retention, Promotion and Tenure committees. Review procedures are more efficient so that articles are usually published within five weeks of receipt. The Journal is about to add index and search capabilities so you can find things more easily on this website. The editors are especially pleased by the range of countries represented among our authors. In this issue we have Finland, Malaysia, Nigeria, Spain, and the United States.

Levitt, Steven D. and Dubner, Stephen J. (2005) *Freakonomics: A Rogue Economist Explores the Hidden Side of Everything*. William Morrow.

Downes, Stephen. OLDaily. http://downes.ca

Editor's Note: This paper explores the frequency and purpose of information exchange on asynchronous forum boards. Analysis of Learning Management System data is based on Oliver and McLoughlin's five dimensions of interaction and categories of exchanges. Analysis of derived data on number and types of interactions and thread levels provide valuable information for program evaluation and instructional design.

The Open University Malaysia Learning Management System:
A Study of Interaction in the Asynchronous Forum Board

Syed Abdullah Syed Othman, Hanafi Atan, Cheah Kooi Guan

Abstract

The Open University Malaysia (OUM) is the largest Open and Distance Learning (ODL) institution in Malaysia with the current enrolment exceeding 23,000 students. In terms of teaching and learning, the OUM utilises the blended approach that combines printed learning materials as the main learning resource supplemented by face-to-face interactions at regional centres and online learning through a specially designed Learning Management System (LMS). One important feature incorporated into the LMS is the asynchronous forum board. The provision of the asynchronous forum board allows empowerment of a geographically dispersed group of students to participate in a collaborative learning environment with tutors and peers.

This article reports on the study that elucidated the type of communicative dimensions that transpired in such an asynchronous forum board. The analysis of the interaction was based on the Oliver & McLoughlin interaction model consisting of five interactive dimensions namely, social, procedural, expository, explanatory and cognitive, across five combinations of forum exchanges between the lecturer, students and the group as a whole. The results revealed that the explanatory dimension in the student-tutor and tutor-student interaction combinations was the dominant one. This was followed by the procedural dimension. The expository, social and cognitive dimensions were the least dominant. The depth of the interactions was evaluated by the thread levels and findings revealed that most interactions progressed up to the second thread level of interaction. Fewer interactions progressed to the third and fourth thread levels. The impact of the pattern and the depth of interaction in enhancing the quality of knowledge construction and the understanding of the course materials is discussed and highlighted.

KeyWords: learning management system, LMS, asynchronous forum board, interaction, distance learning, learning environment, collaboration, open university, learners support system, learning facilitation, communication, thread level of discussion, learning engagement

Introduction

The Open University Malaysia (OUM) is the first private Open and Distance Learning (ODL) institution in Malaysia and its establishment in the year 2000 was to fulfil the nation's aspiration to increase the access of higher education to more Malaysians, especially working adults. Its mission statements are that the institution would be the leading contributor in the democratisation of education, it would develop quality education through multimode learning technologies, and

develop and enhance learning experiences to promote development of a knowledge-based society (STAR, 2004).

The expansion of the OUM is tremendous and this can been seen in terms of the current student population of more than 23,000 after three years of operation. The OUM teaching-learning system is premised on blended pedagogy whereby print-based materials provide ready input alongside face-to-face tutorials and online learning (OUM, 2004). The online learning involves provision of online course delivery tools through the Learning Management System (LMS). The OUM LMS – MyLMS is the homegrown LMS that allows the integration of various features such as instructor tools, instructional features, students' tools, technical support, administrative tools and other administrative features.

There have been a number of studies conducted to evaluate various features embedded in the LMS such as those of the multimedia learning system (Low et al., 2003) and the open source (Zulham et al., 2004). The incorporation of the multimedia learning system and the management operation was found not only to increase efficiency but also empower geographically and temporally dispersed groups of educators, administrators and students to participate in a dynamic learning organisation, and thus enhance learning through engaging activities (Low et al., 2003). Zulham et al. (2004) on the hand, stressed the important features of the open source LMS that are robust enough to satisfy the varying needs of the educational institutions in terms of the pedagogical approaches.

One important feature of the LMS is the asynchronous forum board – a communicative platform for collaboration and group work that helps to clarify issues pertaining to course contents. Significantly, this feature may be described as a learning environment whereby the written text is transmitted back and forth between two or more persons who are at different locations. They read the text and respond to it at a later time, thus creating a whole new level of interactions and generating a rich collaborative and communicative learning environment (Healey & Brayn-Kinns, 2000).

An interaction is a complex variable that has many facets (Kearsely, 1995). The significance of an interaction is that it provides the means for learners to receive feedback. Insofar as feedback determines successful learning progress through the correction of mistakes or the promotion of motivation, it can be argued that the more interaction provided, the better the progress. Stanberry (2000) conducted detailed studies of interactions and concluded that increased interactions improve students' achievements and attitudes towards learning. Interactions engage learners, causing them to reflect on ideas and articulate them. Interactions also encourage and facilitate cognition and play an important part in promoting learners' intellectual operations and thinking processes (Clements & Nastasi, 1988; Thurmond & Wambach, undated).

Many conceptual frameworks have been put forward to describe the pattern and structure of interactions in the technology-assisted course delivery in distance education programmes (Moore, 1989; Robson, 1996; Oliver & McLoughlin, 1997a; Fahy, 2001). Moore (1989) proposed the lecturer-students interaction, learner-learner interaction and learner-content interaction as the three main types of interactions that can be supported by synchronous interactive technology. Fulford & Zhang (1993) identified personal interaction, overall interaction and satisfaction as critical factors to measure the successes in distance education. Robson (1996), on the other hand, used interpretative methodology and classified interaction in terms of the pattern of exchanges between lecturer and students. Fahy (2001) classified interaction in terms of the functionality of the exchanges such as being referential or engaging and whether they are reflections, acknowledgements or apologies, etc.

The framework used in this study was based on the interaction model proposed by Oliver & McLoughlin (1997a). It is a content analysis model consisting of five critical dimensions that

provide multilevel understanding of the learning process. The five critical dimensions of the interactions are shown in Table 1.

Table 1

The Dimensions of Interactions
(Oliver & McLoughlin, 1997a)

Dimensions of Interactions	Description
Social	Establishing and developing rapport
Procedural	Explanation on course requirements and procedures
Expository	Demonstration of knowledge or skills in response to a direct request from one another
Explanatory	Lecturer using students' responses to explain knowledge and develop content
Cognitive	Lecturer providing constructive feedback to a student to reflect and to reconsider an alternative perspective/reality

In the asynchronous forum exchanges, there are basically two parties involved in the interaction, namely the initiator and the respondent. The initiator and the respondent could either be a lecturer, students or the group. Accordingly, the type of interaction is further classified into categories of exchanges as depicted in Table 2.

Table 2

Categories of Exchanges
(adopted from Oliver & McLoughlin, 1997a)

Category of Exchanges	Description
T-G	Tutor initiates and directs at the group
T-S	Tutor initiates and directs exchange at a specific student
S-T	Student initiates and directs exchange at the tutor
S-S	Student initiates and directs exchange at other students
S-G	Student initiate and direct exchange within the group

The purpose of this study is to investigate the ways the lecturer and students use the asynchronous forum board of the OUM LMS utilising the framework as proposed by Oliver & McLoughlin (1997a). Specifically, this study looks at the types of interactions deployed by the tutor and students and elucidates the extent to which these interactions are being utilised in order to establish the pattern of use. The depth of the discussions is also investigated by establishing thread levels. In a particular topic of discussion, the higher the thread level, the deeper the discussion has progressed and evidently, a higher thread level indicates that a high degree of interaction and learning engagements has taken place. Also of interest to this study is an estimate of the impact of different types of interactions towards the instructional outcomes, learning enjoyment and satisfaction among students. In undertaking this study, the following questions were asked:

a. What are the dimensions of exchanges according to the Oliver & McLoughlin (1997a) model that are being established in the asynchronous forum board of the OUM LMS?

b. What is the depth of these exchanges in relation to the various units of the course content?

Methodology

The data collected from this study were drawn from BBBM 4103 – Bank Management course. It is a third year course for students enrolled in the B.B.A. (Honours) programme offered by the Faculty of Business and Management, OUM. For the September - December 2004 semester session, a total of 25 students were enrolled in this course. Since the students were geographically dispersed in the country, two personalised tutor were appointed. Only the forum exchanges of the 17 students assigned to one of the personalised tutor were used in this study.

The data collected were immediately analysed following the end of the semester on 1 January 2005. The analysis of data involved transcribing the forum messages to enable the complete elucidation of the pattern of student-lecturer and student-student messages as well as the depth of the ensuing discussion. The transcriptions involved a microanalysis and coding of the interaction patterns and information exchanges into the appropriate classifications of interactions, namely, the social, procedural, expository, explanatory and cognitive types. The classifications were arrived at based on questions, statements and the ensuing replies that took place between the lecturer-students and student-students. In some cases, a single exchange involved multiple interactions. For the purpose of this study, a single interaction is defined by the topic and the instructional intent of the message and a single message could therefore contain a number of interactions depending on the topic and the instructional intent of the message. The classification of the types of interactions into respective categories was done with little difficulty as most of the postings were clearly distinguished by their form and functions.

The validity of the classification process was verified by a panel of researchers. These researchers were required to perform the independent coding process based on the framework described and the results obtained showed that they were in complete agreement with the actual coding process. The depth of discussion was manually analysed based on the thread levels achieved by a particular topic of discussion. The analysis involved following the progression of the discussion and the number of messages at given levels was recorded and the frequency calculated.

Results and Discussion

Table 3 depicts the frequency and types of interactions observed in the forum exchanges. A total of 125 exchanges transpired during the entire course with the explanatory interaction being the most dominant (63.2%), followed to a lesser extent, by the procedural (15.2%), social (8.8%) and expository (7.2%) types. The least dominant one was the cognitive (5.6%) interaction. When the interactions themselves were considered and domains of exchanges studied in detail, an interesting picture of the types and forms of interactivity used emerged. It is evident from the table that most of the messages were student-lecturer (S-T) initiated (55.2%) and they were predominantly in the explanatory communicative dimension. The next mode of interaction was the lecturer-initiated interaction, (T-S) with a contribution of (29.6%) to the total interaction. The tutor-initiated interaction to the whole class (T-C) recorded a lesser contribution (8.8%) while the student-initiated interaction recorded the least contribution (6.4%).

Table 3

Number and Types of Interactions

Types of Interactions	Frequency				
	Tutor–Class (T-C)	Tutor-Students (T-S)	Student-Tutor (S-T)	Student-Class (S-C)	Total
Social	2	2	7		11
Procedural	2	7	10		19
Expository	1	2	6		9
Explanatory	2	25	44	8	79
Cognitive	4	1	2		7
Total	11	37	69		125

It is therefore evident that the explanatory communicative dimension with student-initiated interactions (S-T) was the most prominent type of interaction in this forum board. The explanatory type of interaction – regarded as of a negotiative nature involving negotiation between the tutor and students – is known to lead to higher levels of understanding and knowledge construction. The high levels of explanatory interactions observed were a consequence of the primary high level of knowledge development that was being sought by the students. The role of the students as central to the learning process is widely espoused by the literature (Kinzie, 1990; Oliver & McLoughlin, 1997b; Atan et al., 2005). The students should play a primary role in initiating the communication that leads to more cooperative and collaborative activities among them, thus increasing the levels of reflective and cognitive activity on their part and promoting high-order learning. The lecturer, on other hand, should encourage and develop learning environments with high levels of communication, collaborative discourse and student-centred activity (Oliver & McLoughlin, 1997b).

The procedural type of interaction recorded the next highest contribution and as in the explanatory type of interaction, most of the exchanges were in the S-T category. These messages were those enquiring about the course in general, information related to assignments, tests and the examination, and information related to course requirements and procedures. The frequency of student initiated procedural interactions is indicative of the need of the students to manage their learning from a distance. For example, they need to know the status of assignments and marks obtained as well as course requirement-related matters in general.

The exchanges involving the desired and preferable cognitive dimensions imperative for effective knowledge construction recorded the least contribution to the total interaction observed. This type of interaction requires the tutor to direct the communication to individual students rather than to the group as a whole and such interaction must have the characteristic that challenges the students' current understanding of the concept and provides them with different perspectives of the concept. Such interactions promote high-level thinking and enhance memory retention as well as provide better understanding of course contents. A study by Mason (1991) corroborated that the lecturer plays a pertinent role in enhancing the effectiveness collaboration. However, only highly skilful tutors can influences the discussion process in this cognitive dimension by probing into the new perspective of concepts, putting forward real and authentic problems to require students to seek and share learning resources and redirecting the conversation pattern for active and meaningful students' participation. A further study that looks into the role of the lecturer in

online discussions that promote active student engagement as well as critical thinking opportunities (thus making learning enjoyable and meaningful) is therefore imperative.

It is also noted that very minimal interaction occurred between students and the group as a whole, i.e., in the student-group (S-G) category. This is an indication of very little collaborative learning and the sharing of ideas and knowledge taking place as a group. The technology has provided the means to create positive and engaging learning environments that provide adequate opportunities for genuine dialogue and social interaction, which are vital elements in the learning process. However, as these results indicate, these were not adequately used by the students to seek out particular learning outcomes and advantages.

Table 4 depicts the thread levels of interactions. It is evident that the analysis of the depth of the exchanges revealed that the exchanges were mostly only in the first thread of interactions (43.2%), an indication of a single or an initiator posting. Some of this initiator postings received feedback and comments as evident in the exchanges that progressed to Thread 2, implying two-way communications between an initiator and subsequent respondents (34.4%). However, only a very small proportion of the feedback progressed to Thread 3 (16.0%) and a much lesser extent of exchanges progressed to Thread 4 (6.4%).

Table 4

The Thread Levels of Discussions

Course Heading	Frequency				
	Thread 1	Thread 2	Thread 3	Thread 4	Total
Assignment	8	17	2	1	28
Unit 1	24	15	7	4	50
Unit 2	12	2	5	3	22
Unit 3	7	5	6		18
Unit 4	3	4			7
Total	54	43	20	8	125
Total as %	43.2%	34.4%	16.0%	6.4%	100%

The high percentage of Thread 2 discussions vis-à-vis small proportions in Thread 3 and Thread 4 indicated that the forum exchanges were mostly in the domain of student initiation and directed to the tutor, this being followed by subsequent feedback from the tutor. Such a discussion lacked depth with no participation from other students that would prolong the progression of the discussion leading to more enhanced learning. It is also probable that the topics of discussion posted by the initiator were more individualistic in nature and hindered contribution from the other students. Subsequently, they were of less benefit to the group as a whole in terms of the learning outputs. It is also indicative of an environment where much of the potential educational advantages that result from communication and rich social interaction are absent. It therefore appears that a meaningful step in the future would be the provision of training among tutors that enable them to encourage students to engage in more effective and challenging interactions.

Summary

The interactive element in the asynchronous forum board of the OUM has successfully created a positive learning environment through the high level communicative exchanges and instructional purposes as evident in the high frequency of exchanges recorded in the explanatory interactive dimension. The interaction is highly student initiated and mostly directed to the tutor. However, it appears that the interactions observed in this study lack the desired depth imperative for a rich and active collaborative environment that creates meaningful learning experiences among students. The interaction also lacks the preferable cognitive dimensions necessary for high levels understanding and knowledge construction. The provision of training is therefore imperative among tutors so that they are become skilful at encouraging students to engage in more meaningful interactions that promote enhanced memory retention as well as better understanding of course contents.

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Editor's Note: Agent-Based Intelligent Tutoring Systems can be characterized as an enhanced form of branching program or a simplified precursor of learning objects. They provide customized learning to meet a variety of learner needs. The structures and activity diagrams in this article invite additional theory, research, and practice in flexible learning and instructional design.

An Agent-Based Intelligent Tutoring System for Enhancing E-Learning / E-Teaching

José M. Gascueña, Antonio Fernández-Caballero

Abstract

Intelligent Tutoring Systems (ITS) have proven their worth in multiple ways and in multiple domains in Education. This paper introduces application of an agent-based Intelligent Tutoring System for enhancing e-learning / e-teaching. The general architecture of the ITS is formed by the three components – the Student Model, the Domain Model, and the Pedagogical Model. An Educational Model is added to provide functions that the teacher needs to use the system. The Pedagogical Model provides mechanisms to efficiently present subject matter to the student (pedagogical strategies). In the Pedagogical Model incorporates four agents – the Preferences Agent, the Accounting Agent, the Exercises Agent and the Tests Agent –to monitor student progress and propose new tasks. The Educational Model recommends how to enhance the structure of the presentation. Across this module, the teacher changes preferences, gives reinforcement to students, obtains statistics and consults the subject matter.

Keywords: intelligent tutoring system, agent system, e-learning, e-teaching, distance learning

Introduction

This document is structured as follows: 1) Introduction, 2) Agent-based ITS in Education, 3) Objectives and Architecture of Agent-Based ITS, 4) Strategy of the Pedagogic Module, 5) Description of the Agents that monitor student progress and propose new tasks, 6) The Education Module and functions for the teacher and students, and 7) Conclusions.

Intelligent Tutoring Systems (ITS) are programs that possess a knowledge-base on certain subject matter. The ITS is designed to transmit this knowledge to students by an interactive individualized process that emulates a human teacher or tutor guiding a student in his learning process. ITS are growing in acceptance and popularity for several reasons: (i) increase in student performance, (ii) a deepened cognitive development, and, (iii) a reduced time for the student to acquire skills and knowledge (Sykes & Franek, 2003). An ITS incorporates three models corresponding to three knowledge levels. A domain model gathers domain knowledge to be taught; a student model represents what the student knows, and a pedagogical model of instructional strategies to teach domain knowledge. The goal for every ITS is to communicate its embedded knowledge in an effective manner (Wenger, 1987).

Intelligent Tutoring Systems (ITS) adapt to the needs of each student. Pedagogical strategies, specify how to sequence content, kind of feedback to be given, and how the tutor's content (problems, definitions, examples, and so on) are shown or explained (Murray, 1999). There has been extensive research in learning strategies to be incorporated into ITS (Boulay & Luckin, 2001). As an example, Meyer used analogy to teach a less known domain from a more familiar one. (Meyer, 2002) The case-based reasoning paradigm helped to increment new knowledge (Martens, 2004). When various strategies are implemented together in an ITS, as for instance in (Hatzilygeroudis & Prentzas, 2004), the system selects the most appropriate one for the activity

that the student is performing. This paper will focus on pedagogic strategy of the pedagogical model of the ITS to introduce subject matter in a more efficient way to students.

Experts have suggested agent technology to address the challenges of computer-based education (Aroyo, Stoyanov & Kommers, 1999). "*An autonomous agent is a system situated within and a part of an environment that senses that environment and acts on it, over time, in pursuit of its own agenda and so as to effect what it senses in the future*" (Franklin & Graesser, 1996). Any agent, in accordance with this definition, satisfies four properties: autonomy, social ability, reactivity and pro-activeness. By using intelligent agents in an ITS architecture it is possible to obtain an individual tutoring system adapted to the needs and characteristics of every student (Cardoso et al., 2004). This paper provides a detailed description of the agents that monitor the progress of the students and propose new tasks.

Agent-Based ITS in Education

Many learning/teaching computer-based environments use ITS agent technology. Capuano et al. (Capuano, Marsella & Salerno, 2000) described ABITS as suitable to several knowledge domains and composed of different agents (evaluation, affective and pedagogical agents) that extend the traditional Course Management System with "intelligent" functions for automatic curricula generation. Dorça et al. propose a similar approach (Dorça, Lopes & Fernández, 2003).

The Baghera platform is a web-based multiagent learning environment for assisting students/teachers in learning/teaching of Geometry. Baghera is composed of two multiagent systems (MAS). The higher-level MAS is composed of cognitive agents which provide the main function of the educational system, while the lower-level MAS is responsible for diagnosing student's conceptions (Pesty & Webber, 2004). MyClass includes an agent tutor that can re-plan teaching strategies to best fit a student or group of students at each stage of teaching/learning sessions in a virtual classroom (Mota, Oliveira & Mouta, 2004). Tang (Tang & Wu, 2000) implemented a multi-agent intelligent tutoring system to learn programming languages. Electrotutor is an Electrodynamics distance teaching environment designed according to JADE - Java Agent for Distance Education framework (Silveira & Vicari, 2002). For collaborative work, I-Help allows the students to locate human peers and learning resources for help during learning activities (Greer et al., 2001). An architecture of Intelligent Virtual Environments based on the agent paradigm is offered in (de Antonio, Ramírez, Imbert & Méndez, 2005) and for nurse training in (Hospers et al., 2003).

An ITS usually incorporates pedagogical agents (animated characters) to make learning more attractive and effective (Johnson, Rickel & Lester, 2000). The architecture introduced in this paper does not incorporate an animated agent at this time. Currently, adaptive and intelligent Web-based educational systems (AIWBES) form a new approach to develop learning/teaching environments using adaptive hypermedia and intelligent tutoring technologies (Brusilovsky & Peylo, 2003). MASPLANG is a multiagent hypermedia systems (Peña, Marzo & de la Rosa, 2002).

ITS found in core databases, physics, language, mathematics, medicine, and other courses in many schools, do not use the agent technology. For instance, KERMIT (Suraweera & Mitrovic, 2004) teaches the conceptual modeling of databases using the entity - relation data model, ELMART (Weber & Brusilovsky, 2001) teaches programming in LIPS, and Design Pattern (Jeremic, Devedzic & Gasevic, 2004) is used to learn design patterns.

Objectives and Architecture of Agent-Based ITS

The ITS proposed in this paper creates an infrastructure for distance learning/teaching of a subject matter. To obtain good results, it decomposes subject matter into theory, exercises and test

questionnaires (see Figure 1). Learners study each subject matter topic reading theory first, then participating in exercises and finally answering a test. The system helps students when necessary.

The first goal of the ITS is that students learn more and better; the subject matter is structured to facilitate learning. One learning characteristic is rhythm. The ITS adapts concepts to the learning rhythm of each student (for instance, to show more or less exercises, to show more or less tests, etc.). Another aspect from learning theory is reinforcement to rewards a correct answer and penalize errors (by means of messages, sounds, etc.).

Another ITS goal is to enhance teaching as well as learning. A professor does not know the skills of his learners. One proposal is to "teach how to teach". Within this objective is the need to make the subject matter more comprehensive for the group of learners, keeping in mind the requisites given to the subject.

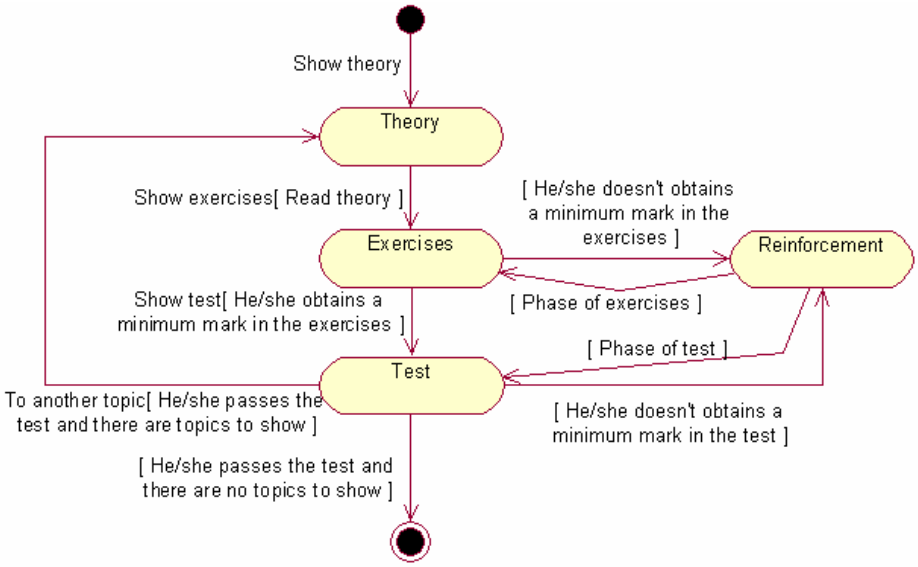

Figure 1: Decomposition of the subject matter

Three components characterize the ITS architecture (see figure 2) – the Student Model, the Domain Model, and the Pedagogic Module. An Educational Model adds functionality for the teacher. In the Pedagogic Module, four agents are added. The proposed ITS is not tied to any course in particular, the only requisite being that the course has to be divided into theory, exercises and tests.

In the Student Model, knowledge about the student (profile and interaction with the system) is composed of three knowledge databases (KDBs). (1) The Personal Information KDB stores personal data to control his access to the system. (2) The Profiles KDB stores students level and presentation styles. Students are assigned different levels depending on their learning rhythm. (3) The Learning KDB stores parameters such as exercises and tests proposed so far, the time spent on answering questionnaires and the exercises, pages of theory visited, scrolls performed on those pages, or the reinforcement material prepared by the Pedagogic Module.

In the Domain Model, knowledge about the contents to be taught is stored. This model consists of four KDBs: (1) the Theory KDB incorporates the pages of theory that have been prepared for teaching on the subject matter, (2) the Tests Questionnaire KDB stores the battery of test questions related to the subject matter, (3) the Exercises KDB stores the battery of exercises on

the subject matter, and, (4) the Reinforcement KDB contains the information used by the Pedagogic Module to prepare the material to be shown when a student needs to be reinforced.

The Pedagogic Module provides mechanisms to efficiently present the subject matter to the student. This module performs three tasks: (1) provide the learning guidelines for the student (including reinforcement provided by the system), (2) update statistics of the exercises and tests presented in the Domain Model, (3) store reinforcement data into the Learning KDB, the responses given by the student to the exercises and tests, punctuation used, and the time he has spent in reaching the aims.

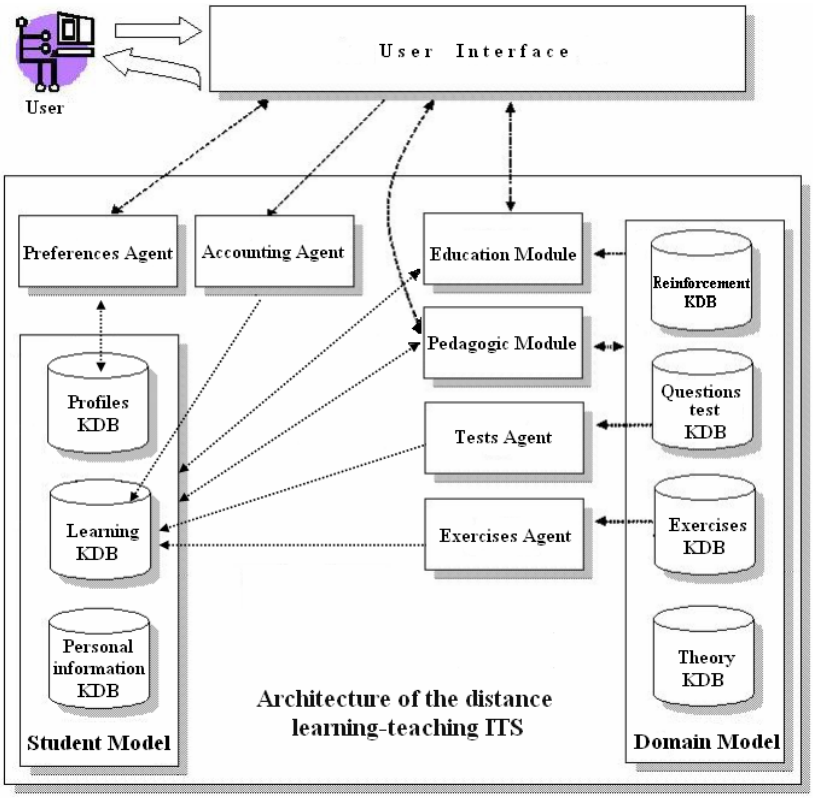

Figure 2: Architecture of the agent-based ITS system.

The Preferences Agent supervises the user-preferred style of presentation (type and size of letter, colors, margins, and so on). When the user changes his presentation style, the Preferences Agent creates a personalized style sheet and updates the user's interface. The information that this agent gathers is stored in the Profiles KDB.

The Accounting Agent observes the student interaction with the interface when he accesses a page of theory. When the student changes to another theory page, the Accounting Agent stores data in the Learning KDB (the name of the visited page, time the student spent and scrolls performed). The Exercises Agent chooses exercises that will be proposed to the student in the topic that he is currently studying. This agent stores the chosen exercises in the Learning KDB as well. In the same way, the Tests Agent is in charge of choosing the test questions that will compose a test questionnaire in the topic that he is studying. The test questions selected are also stored in the Learning KDB. The Exercises Agent and the Tests Agent do the selection when the student finishes the first visit to the first page of theory of every topic. We may highlight that the Exercises Agent and the Tests Agent are proactive because they carry out their tasks in parallel

with the activity that the student performs. Indeed, the student is reading theory without realizing the work of both agents. The agents are implemented as applets.

The Education Module provides functionality needed by the teacher. Across this module, the teacher changes preferences, gives reinforcement to the students, obtains statistics and consults the subject matter. This module is to help the teacher to change the contents of the subject matter on the basis of information obtained from the Student Model and the Domain Model.

Strategy of the Pedagogic Module

Figure 3 shows the steps followed by the pupil when studying each topic of the course ("Subject matter learning").

1. First, the student must read the whole theory for the current topic.
2. The student has to solve the proposed exercises. A level-1 (low level) student, first solves the basic exercises and then the complex ones. A level 2 student (high level), solves only the complex exercises. The basic exercises are all shown in sequence and the ITS evaluates if the student has reached the designated minimum score.
   Complex exercises are shown in blocks (a pre-determined number of exercises). A predetermined minimum score is required before composing the next block. After correctly fulfilling the complex exercises, the system goes to the test questionnaires.
3. The student has to solve the test questionnaire.
4. If there are more topics in the course, the system goes back to step (1). Otherwise, the student has finished studying the subject matter.

During steps (2) and (3), if the student does not obtain the minimum scores fixed for the topic, he gets reinforcement in order to reach the objectives for the course.
In activity "Provide reinforcement_1" of Figure 3, the system selects a basic exercise not well solved gets reinforcement material based on previous topics studied. This way the system helps the student to correctly solve the basic exercise. After proposing the reinforcement material, and before the student has to solve again the basic exercise, the ITS shows the bad response that the student gave previously. When the student passes the minimum score, the system does not go on providing reinforcement. Ins the worst situation where system provided reinforcement to all basic exercises that were badly answered and the student has not been able to solve them, the ITS tells the student to consult the tutor personally. After this meeting the student is permitted to advance in the study of the course.

In activity "Provide reinforcement_2" learners are reinforced during solving of complex exercises. The strategy for providing reinforcement to the student in complex exercises is similar to the reinforcement strategy for basic exercises. The only difference is that the ITS firstly tries to reinforce with material of the current topic; and, if the student is still not able to solve the complex exercise, he is reinforced by material from previous topics in the course. If the student has not seen all selected complex exercises, he will only receive reinforcement for exercises offered in the last block of complex exercises. If he already attempted all complex exercises blocks, he will be reinforced for all complex exercises incorrectly solved and not previously reinforced.

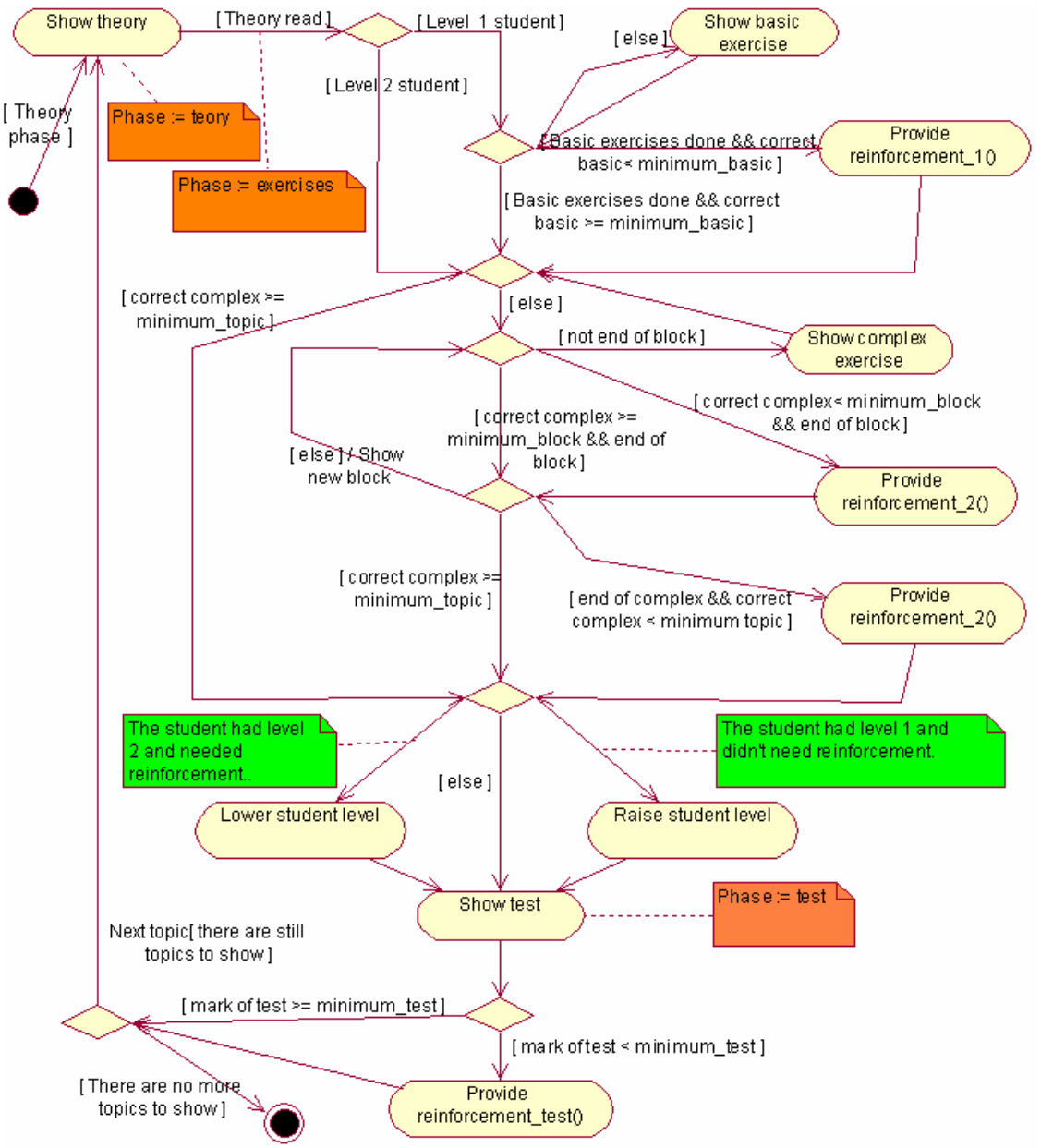

Figure 3: Activity diagram for "Subject matter learning"

Finally, the activity "Provide reinforcement_test" shows what happens if the student does not get a minimum mark in the test questionnaire proposed for the current topic. The ITS builds a new test questionnaire, offers it to the student, and, if the student does not perform well, the professor personally must reinforce in order to proceed with the learning activity.

Description of the Agents

The Preferences Agent

The Preferences Agent supervises the style of presentation that the user likes. It perceives the interaction of the student with the user interface and acts when he changes his tastes. The

preference agent is continually running to know the student's preferences at any time. The process that follows when the user decides to change his visual preferences is reflected in Figure 4. When the student changes preferences, the Preferences Agent shows him a form with the preferences that the he has selected in this moment. This way the user can perform the changes that he considers opportune. After completing the form, preferences are updated and an example page is shown. If the student does not like the page, he can change his preferences again.

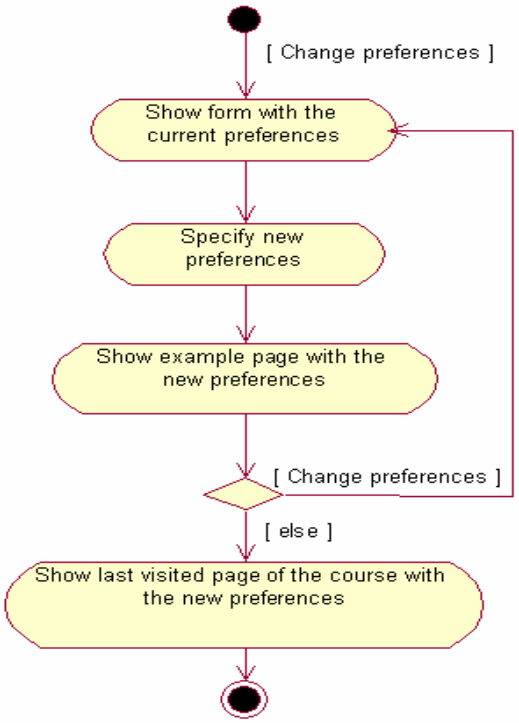

Figure 4: Activity diagram for change preferences

The Accounting Agent

The Accounting Agent perceives the interaction between the student and the user interface when the student accesses a page of theory. This agent watches the scroll and timer spent on each page of theory. When the student leaves that page, the Accounting Agent stores all parameters (scroll and time of permanence) in the learning database.

Figure 5 shows the algorithm to detect the scroll. When the student enters a theory page, he may advance in his reading or go back in the page. Whilst the student is advancing through the page, the value of "Greatest advance" is updated. When he steps back, the value of "Greatest advance" is stored in the scroll history and the value of "Greatest backward" is updated. This process is repeated until the student leaves the page of theory and the Accounting Agent stores all parameters gathered on the scroll history in the learning database.

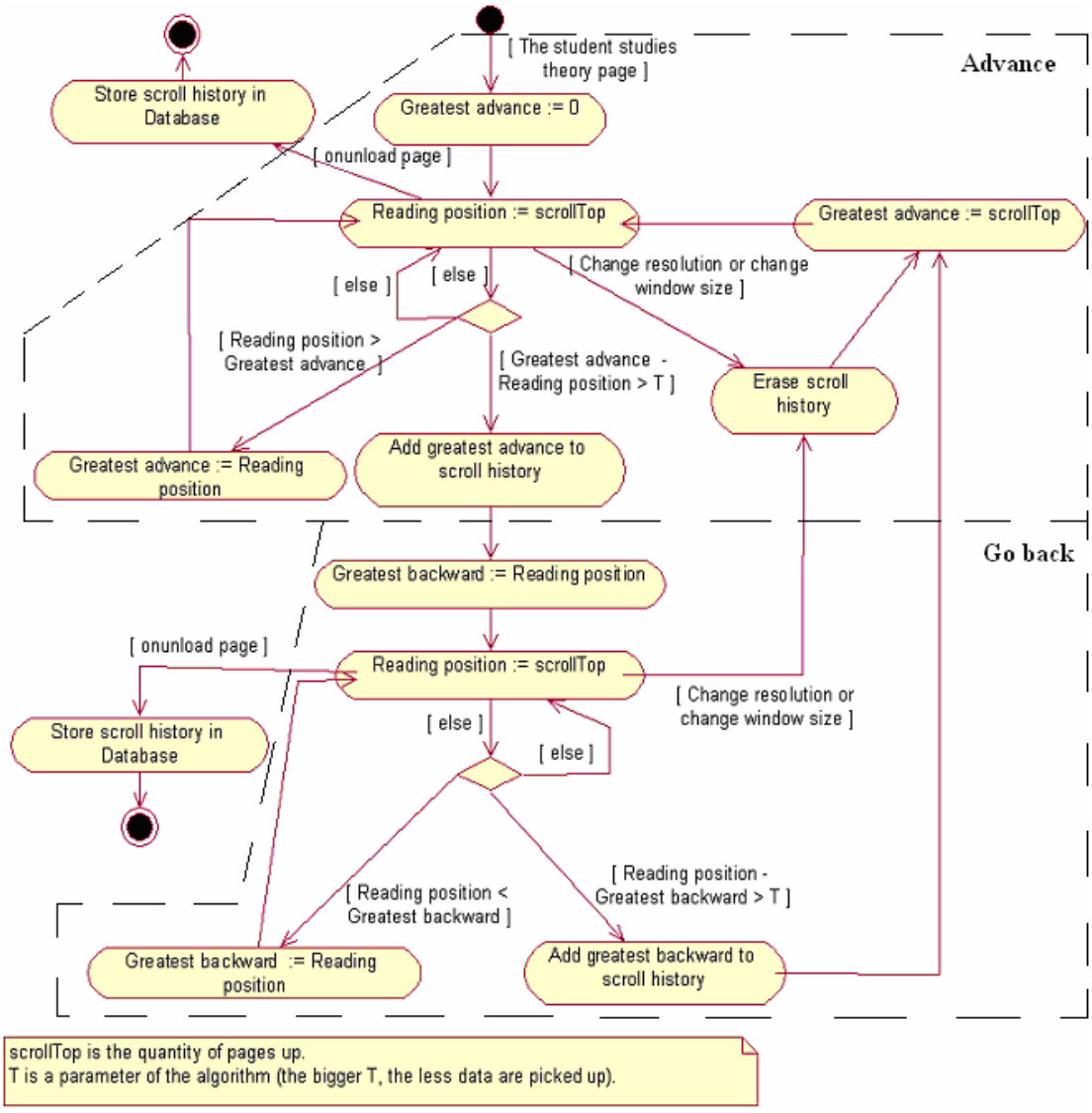

Figure 5: Activity diagram for "detection of scroll"

The Exercises Agent

The Exercises Agent takes charge of choosing exercises proposed to the student in the topic he is studying. The Exercises Agent is autonomous as it controls its proper actions in some degree. The agent by its own (pro-active) means selects the set of exercises to be proposed in the subject studied by the student and adds links to theory pages that explain the concepts related to each exercise. The Exercises agent stores the chosen exercises in the Learning KDB. As it may be observed in Figure 6, when the student visits the page index of the topic he is studying for the first time, the Exercises Agent selects exercises that will be proposed to the student for that topic. Level 1 first selects the basic exercises (state - prepare basic exercises) and later the complex exercises (state - prepare complex exercises). Level 2 alone selects complex exercises. Once it has selected the exercises, the Exercise Agent will remain inactive (Idle state).

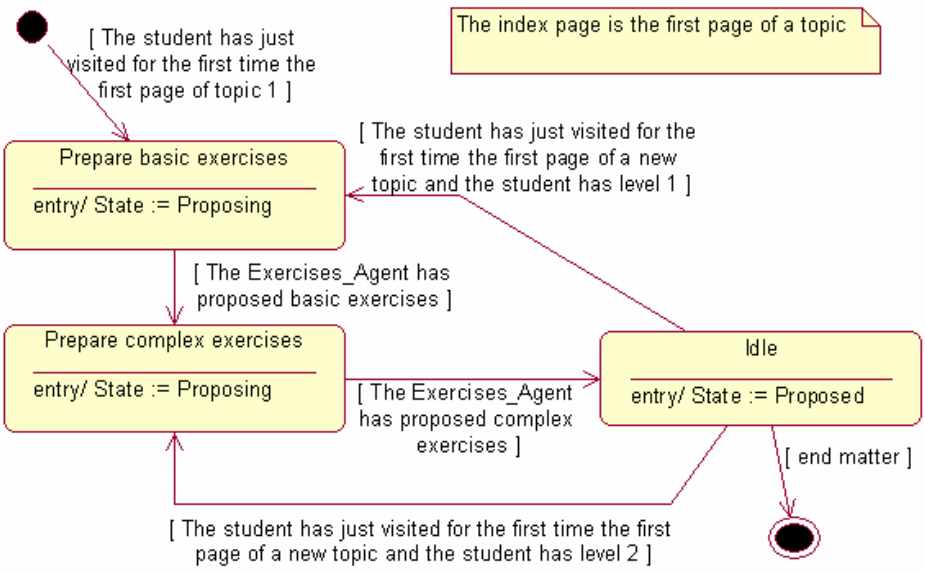

Figure 6: Exercises agent state diagram

The Tests Agent

The Tests Agent takes charge choosing the questions test that will compose the test that will be proposed to the student in the topic that he is studying. The agent by its own means (pro-active) goes on designing a set of tests for the selected subject. These tests will be shown to the student in form of a questionnaire. The Tests Agent performs the selection of questions test at the same time that the Exercises Agent realizes the selection of exercises. Once it has selected the questions, it will remain inactive (Idle state) until the student completes the topic.

The Education Module

The Education Module takes into account the experience of the teacher. The use case diagram in Figure 7 provides the functionality that the ITS offers to the teacher across the Education Module. Evidently, the teacher must be authenticated successfully to accede to the ITS functionality (use case “Authenticate”). Once the teacher has been authenticated, he is able to change his preferences (colors, margins, interlineate, size and type of source of the interface – use case “Change preferences”), to give reinforcement to the students if necessary, (use case “Reinforce the student”) obtains statistics (use case “Obtain statistics”) and to consult all the didactic material (theory –“Consult theory”-, exercises –“Consult exercises”-, and test questionnaires –“Consult test battery questions”) of each of the topics of the subject matter.

The information provided to the teacher is obtained by the Student Model and the Domain Model; this information was picked up and gathered during the user interactions with the ITS.

The greatest benefit is that the teacher may consult statistical data of interaction of students with the system. For every subject matter topic, the teacher is informed of efficiency of the implemented mechanism to reinforce the students by pedagogic module for each topic. The teacher may consult the information on the number of times that students needed reinforcement and how many times students have been personally reinforced by the professor.

The teacher may know the number of times that students have accessed each theory page and the mean time students have been on each page visited. The statistics are classified as (a) pages read during the theory phase, (b) pages consulted during the exercises phase, either solicited by the

student or due to the reinforcement mechanism. The ITS also offers the possibility to know which students performed scrolling when visiting theory pages and reproduce the scroll movements performed.

In the same sense, and in accordance with the exercises proposed to the students, the teacher may observe the possibilities in relation to the exercises statistics. The professor may consult to how many students an exercise has been shown, the mean time the students have spent to solve the exercise and the percentage of blank, correct and incorrect answers to the exercise. There is a classification in exercises presented as reinforcement and normal exercises. Information on how many times an exercise has been explained personally by the teacher is also provided. It is also possible to consult the percentage of pupils that have answered correctly, have answered badly or have not answered an exercise.

Lastly, in relation to test questionnaires, the teacher may look for the number of times that each test question has been presented to the students and the number of times that the students have left the test blank, have answered correctly and have answered incorrectly. It is possible to know if the test question was presented as reinforcement to an exercise, or if it was part of a test questionnaire. Furthermore, the teacher may know the number of times that he had to personally explain the test question.

Another important option available in the ITS is that the teacher can give reinforcement to any student who needs his help. This is because the student has not managed to advance in the study of the subject because the material that has provided to him the pedagogic module is not sufficient to overcome the goals of the topic that he is studying.

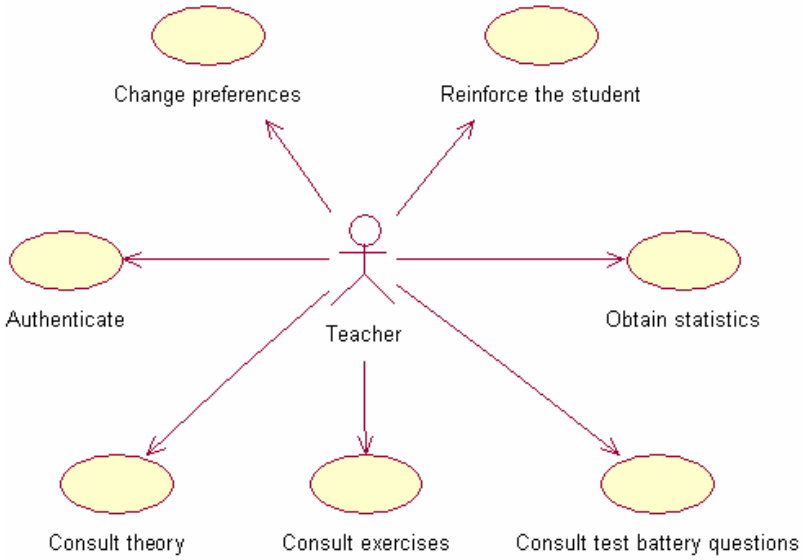

Figure 7: Functionality offered by the Education Module to the teacher

Functional Requisites for the Student

First let us focus on the functionality that the ITS offers to the student (see figure 8). Of course, the student must register in the course (use case “Register for the course”), by typing in his personal data; the system shows the login and the password assigned to enter the course. The registered students can change their passwords (through use case “Change password”) each time they enter the course to begin a new study session.

Once a new study session has been started through use case “Enter the course”, the student reads pages of theory (”Read theory”), answers exercises (“Solve exercise”) or test questionnaires (“Solve test”) depending on the task that a pedagogic module proposes through time. While completing an exercise, the student can consult the theory (use case “Consult theory”) closely related to the exercise.

During a study session, the student can also change the style of presentation of the subject matter (that is to say the visual preferences – “Change preferences”). The student may also consult at any time his state after performing any task.

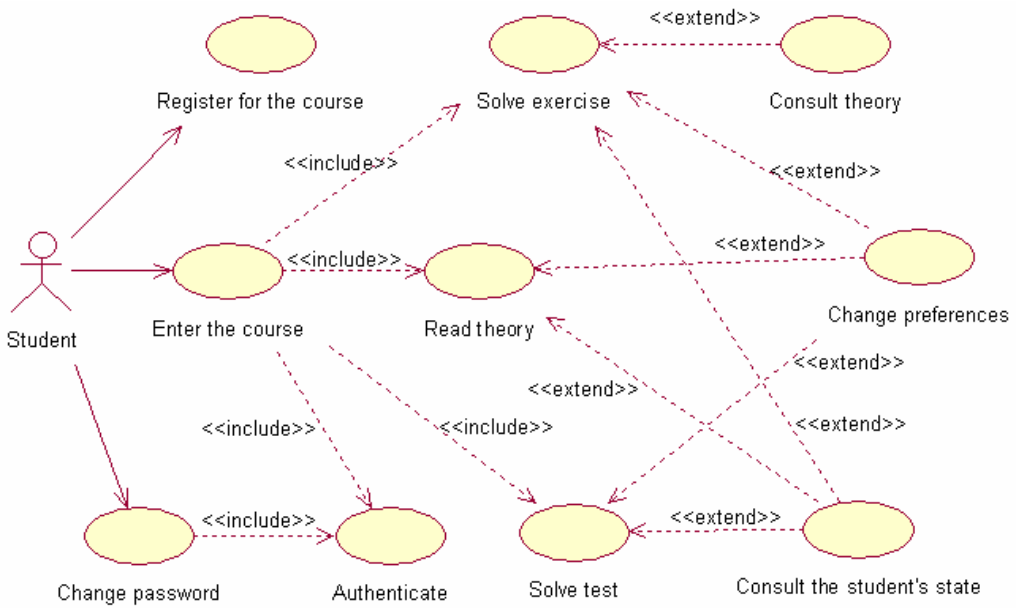

Figure 8: The student’s requisites

Conclusions

The ITS have turned into a technology of increasing interest to complement traditional education so much from the perspective of the students as from that of the teachers. In our distance learning system, we have introduced a Student Model, a Domain Model, a Pedagogical Model, and an Educational Model. In the pedagogical model, four agents – the Preferences Agent, the Accounting Agent, the Exercises Agent and the Tests Agent - have been added.

Also, we have introduced an explanation of how the course adapts to the students as well as to the teachers. User adaptation is provided by means of the so called pedagogical strategies, which among others specify how to proceed in showing the contents of the subject matter for a better assimilation of the knowledge by the student. Precisely, the Pedagogical Module represents this knowledge.

To conclude, the ITS proposed gets all needed data, obtained fruit of the interaction of the students with the system, to adapt the rhythm of introducing the contents of the subject matter to the learning rhythm of each student. On the other hand, the Education Module obtains measures that permit to get recommendations to teacher to enhance the course. This way, jointly e-learning and e-teaching are greatly enhanced.

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Editor's Note: This research from Nigeria shows that certain kinds of subject matter are learned better using non-traditional modes of teaching. An accounting course with a high failure rate was chosen for this experiment.

A Comparative Analysis of Two Methods of Teaching Financial Accounting at Senior Secondary School

Raymond Uwameiye and Ogunbameru Mercy Titilayo

Abstract

This research investigates the effect of the conventional method of teaching vis-à-vis the effect of an alternative method of teaching (guided discovery method of teaching) on students' performance in financial accounting. Two groups, the experimental and control were subjected to different treatments (instructional methods). Both groups were also subjected to pretest and post test using the same instruments. The population of this study comprised all twenty-two Senior Secondary School two (SS2) financial accounting students in Okitipupa Local Government Education Area of Ondo State in Nigeria. Findings of study indicated a difference in pretest and posttest mean performance scores of students in control and experimental groups; and mean performance score of students taught with guided discovery method and those taught with conventional method in financial accounting achievement posttest scores. The study also revealed no difference in the mean performance scores of male and female students taught with guided discovery and conventional method of teaching respectively.

Background to the study

The Federal Republic of Nigeria (2004) stated the broad goal of the secondary school education is to prepare individuals for: "useful living within the society and higher education". To achieve this objective, secondary school education in Nigeria has six years duration given in two stages – three years of junior secondary school followed by three years of senior secondary school. The curriculum designed for senior secondary school is comprehensive and broad based, aimed at broadening students' knowledge and outlook. Subjects offered in senior school are in three groups – core subjects, vocational and non-vocational subjects. One of the vocational subjects is Financial Accounting.

According to Asaolu (2002), "Financial accounting is the process of recording, classifying, selecting, measuring, interpreting, summarizing and reporting financial data of an organization to the users for objective assessment and decision making." Accounting data are processed into accounting information through the use of accounting principles and conventions. The accounting principles are known as "generally accepted accounting principles." They are the basic fundamentals which guide accountants in recording, appreciating and assessing accounting information as well as the preparation and interpretation of financial statements. The accounting information system is proven, time honored, and its format is universally understood. Books of accounts prepared by accountants in one part of the world are easily understood by their counterparts in other parts of the world because the information system is based on principles that are widely accepted and globally used. According to the National Examination Council (NECO 2004), the objectives of studying financial accounting at senior secondary school are as follows:

1. To enable senior secondary school students appreciate the basic rules, functions and principles of accounting

2. To lay proper foundation for further study of accountancy and allied courses at higher level and
3. To enable the students understand basic accounting principles, practice and their applications to modern Business activities.

To achieve the above stated objectives, financial accounting teachers employ various instructional methods in the classroom. According to Cantrell (2004), teaching methods are in a continuum, ranging from exposition to inquiry.

The **Exposition** method of teaching is conventional and widely used in the classroom. Also, Cantrell (2004) reported the characteristics of exposition method to include the following: leader-centered, leader-active, learner passive and content emphasis. Examples of exposition methods are lecture, discussion, traditional demonstration, guest speaker, panel discussion, story telling, dramatization, and reading of textbooks, manuals or handouts.

The **Inquiry** method is an approach where the learner generates his/her own form of information. It is characterized by the following features: learner-centered, leader-facilitated, learner-active and learning process emphasis.

In general, exposition is considered to be leader centered with an emphasis on content delivery while inquiry is considered learner centered with the emphasis on the process of learning. In a typical learning situation this suggests that for exposition, the leader is actively involved (for example lecturing, reading aloud, showing a video) and the learner is passively taking in the information (for example listening, reading an overhead, watching a video).

In contrast, learners engaged in inquiry are actively involved (for example: conducting investigations, processing information and data) while the leader's role is to help facilitate the process of learning (Cantrell 2004). Examples of inquiry methods are guided discovery, problem solving and inquiry methods. Guided discovery learning is a method of learning that has the advantage of allowing learners to use process skills to generate content information. It actively engages learners in first hand real world learning. It encourages learners to explore the content through the use of concrete experiences. Teachers are released from the role of authority and giver of knowledge to become facilitator and fellow investigator. This replaces the notion that the teacher must know all the answers.

Graphic representation such as maps, time tables, flow charts which depict the sequencing of learning activities (Advance Organizer) and other such devices are effective way for teachers and text book authors to promote discovery learning.

Advance organizer as a motivational strategy for meaningful learning

Ausubel (1970) stated that sequencing of subject matter or concept from general concept to the specific such that meaningful relationship can be deciphered from it, is guided discovery learning. Several factors influence teacher's choice of teaching method for classroom instruction. According to Onwegbu and Kpangba (1995), some of these factors are cost, preparation time, knowledge of the method, nature of the subject matter, curriculum prescription and research recommendations on sequencing of the learning experience. These are factors that the financial accounting teacher must bear in mind.

Akintelure (1998) reported that financial accounting teachers' effectiveness in instructional delivery depends on their consideration of the nature of the subject during instructional planning. According to her financial accounting is not a subject that can be mastered by mere memorization of the basic rules. It requires total involvement of the learner in the learning process, sound theoretical knowledge and intensive practice in application of basic principles. To what extent

financial accounting teachers involve these principles to teach financial accounting is yet to be determined.

According to Ogunu (2000), poor academic performance has been identified as a problem in Nigerian secondary school public examinations. For example, WAEC (2000) analysis of percentage performance of candidates in twenty popular subjects in West African Senior Secondary Certificate Examination for 1998, 1999, and 2000 revealed 52.48%, 58.38% and 51.21% percentage failure in financial accounting. Akintelure (1998) blamed the problem on accounting teachers' insensitivity to the nature of financial accounting when planning instructional activities in the classroom. According to her, financial accounting is not one of the subjects that can be mastered by mere memorization of the basic rules. It requires total determination, sound theoretical knowledge and intensive practice in application. The present study is an attempt to determine the efficacy of guided discovery method of instruction on the teaching of Financial Accounting in senior secondary school.

Research Design

This research was carried out using quasi–experimental design of pre-test, post-test control group. The design offered less rigorous experimental control as compared to the true experimental design. The design was specific with non-randomized control group and non-equivalent groups. This was because the subjects were taken as intact groups composed of mixed of low and high achievers. In addition, the design was expected to correct various group differences statistically.

Population

The population of this study comprised all the twenty two Senior Secondary School two (SS2) financial accounting students with the population of 820 students in Okitipupa Local Government Education Area of Ondo State in Nigeria.

Sample and Sampling Technique

Purposive sampling technique was adopted and used to select schools for the study. A survey of co-educational public secondary day schools was carried out to identify schools that have at least a stream of financial accounting in Senior Secondary School class two (popularly called the SS2). Only schools that have at least one graduate financial accounting teacher with relevant professional teaching qualifications teaching the group used for the study was chosen. Chosen schools were randomly assigned to experimental and control group while students in the sample schools remained in their in-tact classes.

Instrumentation

Two types of instruments that were employed for data collection in this study included:

(a) Instructional Package for Financial Accounting (IPFA)

(b) Financial Accounting Achievement Test (FAAT)

Instructional Package for Financial Accounting

The instructional package consisted of prepared lesson plans on selected topics based on guided discovery method of instruction (Appendix) on one hand and conventional method of instruction (Appendix) on the other hand. The accounting textbook recommended for use by the examining bodies for senior secondary school examination (WAEC and NECO) were used and the topics were taught in line with the Ondo State senior secondary school scheme of work in financial accounting. No special teaching session was organized. Teaching was done in accordance with the selected schools' time–table period allocation in financial accounting.

The lesson plans were prepared on topic by topic matched to period by period basis. Lesson plans outlined the period, the topic and the behavioural objectives of each lesson.

Financial Accounting Achievement Test

FAAT consisted of 20 multiple test items covering the following concepts on partnership accounts.(see Appendix A for Table of Specification). Item analysis (Appendix B) was conducted on FAAT to ensure standardization of the items.

The behaviour measured included knowledge of terms, principles and concepts, interpretation of practice question, application of principles and concepts to practice questions.

The areas of coverage were as prescribed by NECO and WAEC 2004 financial accounting syllabus for senior secondary school.

Validity

IPFA was validated using experts' judgment. Experts in vocational education (Business Education) and experts in educational psychology and curriculum studies in the Faculty of Education, University of Benin, Benin City were consulted. Their criticisms, suggestions and recommendations were affected on the instructional package.

FAAT was validated by a five man panel of judges. All members were from the target population and they were all financial accounting teachers currently teaching in senior secondary schools. They ascertained that the items were representative and related to the chosen concepts in partnership accounts. Suggested modifications on the test items were affected.

Reliability

The reliability of the test instrument was determined by administering the test instrument to the same level of students in another school within the same population area. The school chosen met all the requirements which qualified the original two chosen schools for the study. A test–retest method was used to estimate the reliability of the instrument. The test was administered to an intact class of twenty six (26) students. After a month interval, the same instrument was re-administered to the same students in their intact class. A reliability co-efficient of 0.63 was obtained using Pearson Product Movement Correlation Co-efficient Formula.

Method of Administration of Instruments

The data collection phase lasted for five weeks comprising one single period of forty minutes and double periods of eighty minutes per week. The single periods were used solely for worked examples and they preceded the double periods which were used for instructional activities on the selected topics. All the students in both groups were pre-tested with financial accounting achievement test a week before treatment began. The pre-test scores served as a basis for comparing students' performance in financial accounting test before and after treatment.

The experimental group was taught with guided discovery method of instruction while the control group was taught with chosen accounting concepts with conventional method using only the chalkboard and the recommended accounting textbooks. There was no time for students' interaction in groups. The teacher did most of the talking without any other teaching aids besides chalk, chalkboard and the recommended textbooks.

The treatment group was taught with guided discovery method, graphical representations/organizers were employed to guide students' cognitive process and mental road maps on important points. Relevant questions were carefully matched with the relevant concepts. The concepts were organized logically in order to facilitate easy information processing and as stimuli to elicit students' response to relevant questions. Practical work on accounting practice was given to students after each classroom instructional session.

Control of Extraneous Variables

Some extraneous variables anticipated to affect this study included: teachers' factors, students' factors and school principals' factors (cooperation). To control possible effects of the above extraneous variables, the researcher organized a one day seminar for the financial accounting teachers of the affected schools. The date for the seminar was chosen by consensus; the researcher offered some reward to the teachers for task engagement. No school principal factor was envisaged, however, the affected departmental heads were duly informed. Before instruction, students in the experimental group were given questions on relevant concepts bordering on meaningful understanding of concepts. They were taught collaborative and cooperative learning strategies before they were assigned to groups.

Data Analysis

Descriptive statistics such as mean and standard deviations were used for mean achievement score analysis while inferential statistics such as t-test/z-test were used to test relevant hypotheses.

Findings

Pretest, Posttest Mean Performance Scores of Experimental Group and Control Groups

Research Question 1: Is there a significant difference in the students' pretest, mean achievement score and posttest mean achievement score in both groups?

Hypothesis 1: There is no significant difference in the students' pretest, mean achievement score and posttest mean achievement score in both groups?

Table 1

Pretest, Posttest Mean Achievement Score of Students Taught with Guided Discovery Method and Conventional Method

Group	Variable	N	- X	SD	Z-cal	Z-crit	Standard
Experimental	Pretest	33	31	1.97			
	Posttest	33	62.5	2.3	17.08*	1.96	0.356
Control Group	Pretest	30	18.8	1.99			
	Posttest	30	44.35	1.99	14.18*	1.96	0.36

- ***Significant,***

Table 1 shows a calculated Z value of 17.08 for experimental group pretest, posttest mean achievement scores as against 1.96 criterion value and the control group calculated Z value was 14.18 as against 1.96 criterion Z value at .05 significant level. This rejects the hypothesis of no significant difference in pretest and posttest mean achievement scores of students taught with guided discovery method and conventional method. The difference in pretest, posttest mean and performance scores was not due to chance factor, but was a result of the treatments given.

Posttest Mean Achievement of Students

Research Question 2: Is there a significant difference in mean achievement scores of students taught with conventional method of instruction and the mean achievement score of students taught with guided discovery method?

Hypothesis 2: There is no significant difference in mean achievement scores of students taught with the conventional method of instruction and students taught with guided discovery method.

Table 2

Mean Achievement Scores of Student Taught with Guided Discovery Method and Conventional Method

Group	Variable	N	- X	SD	Z-cal	Z-crit	Standard
Experimental Group	Guided Discovery	33	62.5	2.23	9.92*	1.96	0.366
Control Group	Conventional Method	30	44.35	1.99			

- ***Significant, P < .05***

Table 2 indicates a calculated Z test value of 9.92 while the critical Z value is 1.96 at 0.05 probability level to reject the hypothesis of no difference in the mean performance scores of the experimental group taught with guided discovery method and the control group taught with the conventional method. This shows a significant difference in the mean performance scores of students taught with the guided discovery method and the students taught with conventional method of instruction. Though, both groups improved on their pretest mean performance scores after 5 weeks of treatment, the experimental group post test mean percentage score of 62.5% is higher than the control group post test mean performance percentage score of 44.35%. Moreover, the 62.5% experimental group means score is a credit pass as compared to the control group means score of 44.35% which is an ordinary pass.

Gender Difference of Students' Mean Performance Scores Taught with Conventional Method

Research Question 3: Is there a significant difference in the mean performance scores of male and female students taught with conventional method of instruction?

Hypothesis 3: There is no significant difference in the mean performance scores of male and female students taught with conventional method of instruction.

Table 3

Mean Achievement Performance Scores of Male and Female Students Taught with Conventional Method of Instruction

Group	- X	SD	N	STD Error	Degree of Freedom	t-crit	t-critical
Male	45.5	1.83	8				
Female	43.85	2.04	22	1.08	28	0.31	2.048

P < .05

Table 3 shows a calculated t-test score of 0.31 as against a 2.048 t-test criterion value at 0.05 probability level to retain the hypothesis of no difference in the mean achievement scores of male and female students taught with conventional method of instruction. This shows that the treatment given, ie the conventional method of instruction was the only significant factor that enhanced the boys' and the girls' general performance; there was no skewed or lop-sided performance on the part of the group's boys as well as on the part of the girls. That is to say, in other words that gender difference (male and female) has no effect on the group students' mean performance in financial accounting achievement test.

Gender Difference of Students' Mean Performance Score in Experimental Group Taught with Guided Discovery Method.

Research Question 4: Is there a significant difference in the mean performance scores of male and female students taught with guided discovery method?

Hypothesis 4: There is a significant difference in the mean performance scores of male and female students taught with guided discovery method.

Table 4

Difference in Mean Performance Scores Of Male and Female Students Taught With Guided Discovery Method

Group	- X	SD	N	STD Error	Degree of Freedom	t-crit	t-critical
Male	62.25	2.1	11				
Female	62.75	2.9	22	0.59	31	0.310.	2.000

P < 0.05

Table 4 above shows a t-test score of 0.17 as against a 2.000 t-test critical value at .05 probability level to retain the hypothesis of no significant difference between mean achievement scores of male and female students taught with guided discovery method of instruction was retained. Gender has no significant effect on male and female student taught using guided discovery method. The experimental group students' mean performance scores in FAAT (posttest) was a factor of treatment given and not of gender difference in the group composition.

Discussions on the Findings

Tables 1, 2, 3, and 4 show the descriptive and inferential statistics on the study. The mean achievement scores are descriptive or representative scores of the group or variables they represent while the ***t, z*** scores (calculated and critical values) provide premise for making inference or deductions on their relevant tested hypotheses.

Table 1 shows a significant difference between the academic performance in the pretest and posttest of students taught with guided discovery method (experimental group) and conventional method (control group). This is in accordance with Toby (1997) opinion that individual/group mean achievement score should serve as a basis for making judgment on whether a group/individual has achieved a pre-determined, stated objective or not. He is of the opinion that means achievement score should be regarded as a reliable performance indicator of the treatment given (instructional method). In other words the effectiveness of the instructional method employed in the classroom can be evaluated based on the obtained mean achievement score of the group.

Table 1 also shows that the different treatments given to the experimental and control groups effected positive changes on the students mean achievement scores in post test financial achievement test. However, about how much and to what degree is the conventional method of instruction better than the discovery method of instruction, or vice-verse in achievement of the objectives of students' appreciation of basic rules, functions and principles of accounting, students' understanding of basic accounting principles, practice and their practical applications to modern business activities and laying proper foundation for further study of accountancy and allied courses at higher level?

Table 2 provides the required statistics to answer the research question 2 and test hypothesis 2 which center around the effectiveness or otherwise of the guided discovery method and the conventional method in achieving the stated objectives. Table 2 shows a difference between the experimental group posttest means score and control group posttest mean score. This shows that the students taught with the guided discover method level of attainment is higher than the control group's attainment level. The quality of mean achievement score in experimental group which is a credit pass is also better than the control group's ordinary pass. This implies that the differences in experimental and control group mean achievement scores is not a chance factor but an indication of effectiveness of guided discovery method over conventional method of teaching and learning financial accounting concepts. In this respect, guided discovery method of instruction can be said to be a better method of laying solid foundation and enhancing students' understanding, interpretation and application of financial accounting rules, concept and principle to modern day business activities.

Moreover, the 55.7% percentage failure in control group' post test mean score is a replicate of failure trend in financial accounting students' performance in public examinations. This confirms the findings of Ogunu (2000), and WAEC (2004) analysis of WASSCE 1998, 1999 and 2000 students' performance in financial accounting, with reported failure rate of 52.48%, 58.38% and 51,2% Going by the present scenario in students' performance in public examination and Table 2 statistical analysis on the effect of teachers method on students' performance, conventional method which is predominantly used by financial accounting teachers in the classroom is a contributory factor to students' persistent failure in public examination in Nigeria.

There is also the need to know to what extent, if any, the effect of variable such as students' gender difference on their groups' mean achievement scores. Table 3 and 4 statistics were used to test hypothesis 3 and 4. Table 3, shows that students' gender difference has no significant effect on the control groups' mean performance while table 4 shows that experimental group mean achievement is purely an expression of treatment effectiveness, the effect of guided discovery method on student achievement and not a product of gender difference interplay on students' achievement.

Conclusion and Recommendations

The fact that the posttest mean achievement scores of students taught with conventional method did not differ from the recent financial accounting students' performance trend in public examination as reported by WAEC (2004). It shows that teachers' predominant usage of conventional method of instruction in financial accounting teaching is a contributory cause of student failure in the subject. The use of guided discovery method in place of conventional method will improve students' achievement and change the ugly failure rate trend in financial accounting achievement test. Persistent use of conventional method of instruction in financial accounting will perpetuate the failure trend. In line with the findings of this study, the researchers recommend:

1. Since no nation can be greater than the quality of her teachers; to improve the nation's standard of living and reduce crime rate, unemployment, industrial inefficiency, high capital flight to oversea countries through employment/engagement of expatriates, the educational sector should be improved through training of teachers in the use of effective instructional method in the classroom, especially in the use of guided discovery in financial accounting instruction.
2. Professional bodies such as National Association of Business Educators (NABE), Governmental Bodies such as National Business and Technical Education Board (NABTEB), West African Examination Council (WAEC) and National Examination Council (NECO) should organize seminars, workshops and in-house training for teachers and textbook authors in the use of Guided Discovery Method in financial accounting and other effective methods of teaching other courses.
3. Incentives such as scholarships, grants or loans should be made available to research students and institutions to carry-out more work or study on effective strategies in classroom instructions in general and particularly more study should be done on various techniques of using guided discovery method in classroom teaching and learning.

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APPENDIX A

Table of Specification

Content Areas	Knowledge of Basic Terms	Understanding of concept and principles	Application of Principles	Interpretation of principles	Total
Partnership meaning and Terminologies	1	1	1	-	3
Partnership Accounts	4	2	2	1	7
Admission of New partners	1	2	2	1	6
Dissolution of partnership	1	1	1	1	4
Total No of Items	***5***	***6***	***6***	***3***	***20***

APPENDIX B

Item Analysis

The item analysis was conducted using the twenty six (26) students test scores in the pilot group. Under the item analysis, two indices were computed –namely the item difficulty level and the item discrimination indices.

Item Difficulty Level

Item difficulty was determined by the percentage of candidates that got the right answer out of the total respondents. The formular for calculating the tem difficulty (P) is

$$P = \frac{R \times 100}{T}$$

P = Item difficulty level

R = Number of students who got the answer right
T = Total number of candidates

Procedure for Computing Discrimination index

The scripts of the twenty-six (26) students were arranged in order of merit, the highest score being on top and the lower score below. The number of student – 26 was multiplied by 0.27 and the result was rounded up for 7 (seven scripts) 7 scripts were counted from the top and these formed the upper 7 students (RH). Also 7 scripts were counted from the bottom which represented the lower 7 students (RL). The remaining 12 scripts represented students in-between the RH and RL and were not used for the exercise. The respective values of RH and RL for each item were inserted in the formula for computing discrimination indices for the items.

Final Selection of Items

In the final selection of Items for the Financial Accounts Achievement Test (FAAT) instrument, the following conditions were jointly considered.

1. any item whose difficulty index fell between 20 and 60 were used.
2. any item with negative difficult index was removed and not used
3. any item whose difficulty index fell below 20 and above 60 was not used.

On the whole 16 questions were chosen while four (4) questions were modified (reframed) and were added to the 16 to have a total of twenty (20) questions in all. The table below highlights the test items indexes.

Test Item	Discrimination index	Difficulty level
1	0.42	21.4%
2	0.42	50.0%
3	0.28	21.2%
4	0.42	57.0%
5	0.28	50.0%
6	0.14	29.0%
7	0.28	35.0%
8	0.42	21.4%
9	0.42	57.0%
10	0.28	5.7%
11	0.57	21.4%
12	0.42	57.0%
13	0.28	21.4%
14	0.42	50.0%
15	0.57	35.0%
16	0.42	35.0%
17	0.57	43.0%
18	0.28	43.0%
19	0.46	35.0%
20	0.28	43.0%

Editor's Note: This research examines ways to use bulletin boards to enhance online learning. It demonstrates that reward for participation is needed that to initiate a new option and provides useful comparisons between bulletin boards and threaded discussions.

The Use of Bulletin Boards for Discussions in Online Learning

Brian Newberry

Abstract

Online courses, and even some face-to-face courses have made use of online discussions, mostly using threaded discussion technologies. However most threaded discussion software has limited capacity to allow instructors to shape the discussion and to allow students to shape their messages though the use of avatars, graphics and other means. A new type of software, the bulletin board, has quickly overtaken the threaded discussion in supporting Internet discussion communities, but not in online courses. This is no doubt due to the lack of this type of software in common course management software, such as Blackboard. This study reports the results of using bulletin board software in two online courses. Students generally report the appropriateness of the bulletin board software for supporting class discussions and most find bulletin boards more friendly to use than threaded discussions. A key finding is the need to grade the discussion to ensure student participation.

Keywords: online discussion, online class, discussion board, bulletin board, open source bulletin board

Background

Discussion groups are an important part of the Internet. The Pew Internet & American Life Project has estimated (Horrigan, 2001) that over 90 million people participate in online groups with over 70 million people reporting that they identify with one or more groups on the Internet with which they maintain ongoing contact. These discussion groups succeed or fail based on the ability to serve the needs of its members and through the technology used to support their communication.

Discussion groups are also used extensively in online learning. Here, discussions are used to foster student-to-student interaction (Moore, 1989) in part as a means to help alleviate the isolation that some students report feeling in an online class, as well as to provide a venue for the exchange of ideas, information and opinions about subjects related to the course (Carr-Chellman, 2000). The success of discussions in online classes also depends on meeting the needs and expectations of participants through the technology used to support their communication. Achieving this requires an understanding of the purposes for the discussion, the role of the instructor in the discussion, ways of stimulating student engagement in the discussion and the technology that is employed to support the discussion.

Discussion groups in online classes have frequently used threaded discussions. However new technologies that are in widespread use in Internet discussion communities are now available that may be better suited to supporting online discussions. These new technologies offer richer media, for instance supporting pictures or avatars that can help users experience a greater sense of others in the communication experiences they share. Other technologies exist, such as the synchronous chat, however some researchers, such as Tiene (2000) have found that students seem to prefer asynchronous discussions. This study explores the use of an asynchronous discussion forum using

bulletin board software in two classes in an effort to better understand how online discussions are supported by this technology and how students involved in online discussions view the technology and the experience. Key limitations of this study include a small sample size and the fact that the investigator was also the instructor for the courses used in the study.

Purposes for Online Discussions

When designing online courses, developers and instructors choose from a palette of methodologies and approaches to achieve the selected course objectives. One of these methodologies is the discussion, viewed by some as a means to achieve higher levels of interaction between students. Even prior to widespread access to the Internet some were calling on distance educators to work towards greater student-to-student interaction (Moore, 1989). This type of interaction is sometimes seen as necessary to more closely replicate the social dimension of communication that is available in a face-to-face class. Others have explored student-to-student interaction as a way to ensure a certain quality of experience in online courses (Schrum & Hong, 2002). Phipps and Merisotis (2000) Identified 24 benchmarks of quality that included student interaction with faculty and other students through variety of means including discussions. On the other hand, some feel that online discussions can support student-to-student interaction in ways that may be essential for ensuring that students use higher order thinking skills such as analysis, and synthesis to learn (Weiss, 2000). In some cases student-to-student interaction has been viewed as a means to help aide the efficiency of delivery of online classes by reducing the amount of student-instructor interaction needed. (Carr-Chellman, 2000). This reduction in emphasis on instructor-student interaction is seen as a way to make the course more efficient for the instructor to deliver to greater numbers of students.

Instructor involvement in the Online Discussion

Just as with face-to-face courses, instructors of online courses have different teaching styles. Some prefer to be the primary sources of content, while others prefer to be a guide in their students' exploration of content. Instructors with different learning styles will be involved with online discussions in different ways. No matter what approach an instructor chooses, it seems clear that instructors need to be involved in the discussion in their courses. Jiang, M. and Ting, E. (2000) found that the number of posts made by the instructor was positively related to the average number of posts by students. That is, having the instructor actively a part of the discussion seems to increase student participation in the online discussion, which would seem to argue in favor of having the instructor actively involved in the discussion. However, it is interesting to note that Jiang, M. and Ting, E. (2000) also found that the number of student posts was not related to the students' perception of their learning. This argues that it is not the sheer number of posts that should be considered when determining the effectiveness of an online discussion nor the amount of involvement that instructors should have in the online discussion.

Engaging Students in Online Discussions

Having made the decision to include discussions in online classes, it is important to understand factors that contribute to engaging students in the discussion. The factor that has emerged as the primary way to ensure that students engage in such a discussion is to make participation a part of the course evaluation (Shea, Fredericksen, Pickett, Pelz & Swan, 2001). Interestingly Shea et al. also found that the amount of the course grade that was derived from online discussions was related to the degree of satisfaction students experienced with the course as well as the amount of interaction they experienced. Assigning a grade to online discussion participation has also been shown to be related to the level of perceived student learning (Jiang, M. & Ting, E., 2000). This was especially the case when coupled with clear requirements for participation in the online discussion (Jiang, M. & Ting, E., 2000).

Technology Supporting Online Discussions

A variety of technologies exist to make online discussions happen. While these technologies make online discussions possible, it can also be said that these technologies are filters with varying degrees of opacity through which we try to see each other. Knowing the opacity of the filter, or the characteristics of the medium, can help the users of that medium gauge its effects and thus use it more effectively. The different technologies that support online discussion have intrinsic characteristics such as Social Presence (Short, Williams & Christie, 1976) and media richness (Daft & Lengel,, 1984; Trevino, Lengel & Daft, 1987) that impact the discussion and the members of the group.

Discussions in online classes have largely been supported by threaded discussion technology. Threaded discussions are supported by most course management software such as Blackboard and WebCT. The primary advantage of the threaded discussion is familiarity, many students and many instructors are comfortable with the technology. The primary disadvantage of the threaded discussion is the user interface, which is such that some users fail to respond to a topic within a previously started thread. Another disadvantage is that to read multiple postings, one must click on multiple headings to open each on up in turn. This can be cumbersome and if the hierarchical tree is complex with many subsidiary threads it can be confusing, or tiring to try to maintain the sense of a conversation within a topic.

A technology that has supplanted the threaded discussion in asynchronous discussions outside of education is the bulletin board. Unlike threaded discussions, bulletin boards do not display the topic line of all responses in a thread. Advantages of bulletin board systems include member profile pages, private messages between users, avatars, ability to use graphics in posts and the availability of graphical emoticons. A characteristic that may well be an advantage of the bulletin board is that discussions are dynamically ranked according to the date of the first post and the number of subsequent posts and views. This means that topics that are new are given a chance to be at the top of the list. Topics that draw additional posts also work their way up to the top of the list. Topics that are old or that do not attract additional interest fall to the bottom of the list. Disadvantages include the inability to scan subtopic headers that require users to open a topic to view its subtopics.

Conclusion of Background Discussion

Bulletin board software appears to offer some advantages over the more common threaded discussion tool used to support discussion in online classes. However little research has been done to learn about the appropriateness or usefulness of this new tool. It will be important for such research to be conducted in order to help developers of online course support software make good choices about the addition of functionality to their products, and for instructors and/or designers of online classes to make good choices about choosing technologies for interaction and communication in their courses.

Introduction to the Study

This study describes the use of bulletin board technology in online classes along with developing a better understanding of the use of bulletin boards in online classes. Bulletin board software is commonly used by Internet discussion communities, although such software is not yet supported by course management software such as Blackboard. Because of this, the instructor of these two courses installed the bulletin board software on a self-provided server. This open source software used is available from the Web site http://www.phpbb.com/.

Two courses were part of this study with the experiences in the first course being instrumental to the design of the second course. For this reason each course is treated as a separate study to better show the progression between the first and second courses. Both courses were electives in the

instructional technology graduate program at California State University, San Bernardino, which is on the quarter schedule with ten weeks of classes and one week of finals.

Participants

The participants in course A were 15 graduate students who were enrolled in a completely online course in the Instructional Technology graduate program. The majority of the participants were employed full-time, most as teachers. All students had basic computer skills with a few having above average computer skills.

Procedure

Course A was a completely online and asynchronous course with none of the scheduled eleven classes being held face-to-face although an optional face-to-face orientation session was available. The course made use of textbook readings with associated response questions, three online multimedia-enabled module lessons, a technology inventory assignment, a literature review assignment, and a Web site evaluation assignment. In this course the bulletin board was established and promoted as a tool for social interaction in the class as well as being a means to discuss course content with the instructor and other students. No specific assignment required the use of the bulletin board and no part of the course grade was based on using the bulletin board.

The way that the bulletin board was used in course A was designed to answer the following questions.

1. To what extent will students make use of an online meeting space to alleviate potential feelings of social isolation?
2. To what extent will students make use of an online meeting space to attempt to interact with the instructor about the course content or assignments?
3. To what extent will students make use of an online meeting space to work together or seek assistance from other students with course activities and assignments?
4. What are student reactions to the new discussion technology.?
5. Will students use the advanced features (avatars, links, automatic quotes, etc.) of the bulletin board?

While no part of the course grade was determined by the use of the bulletin board in course A, the instructor made reference to the bulletin board, and encouraged its use by mentioning it in weekly emails to each student and by providing the Internet address of the bulletin board in these emails. Additionally the instructor made 14 posts in various forums on the bulletin board in an effort to stimulate use of the technology. These posts were on a number of subjects including material directly related to the course content, items of general interest related to technology used in education, and several social posts asking students in the class to share information about themselves. These posts were placed in appropriate forums, i.e. social posts were made in the forum dedicated for social discussions, and were made modeling appropriate posting conventions to serve as a model for discussion board interaction. In addition, the instructor used a picture of himself as his discussion board avatar to model the use of this feature of the discussion board software.

Results

Despite the repeated mentions of the board by the instructor, the discussion board was not well used by participants with a total of three posts being made by students in the class. Eight students from course A participated in an email exchange and/or face-to-face discussion of ideas about the

online course including the use of the bulletin board. When asked about posting on the bulletin board the majority of students responded that they did not participate because the online discussion was not required. Some indicated that the required elements of the class were time consuming and they did not have time to do any socializing. When asked if they missed the social dimension (research question 1) and professional networking that typically takes place in a face-to-face class several students said that they did miss that feeling of being engaged in a common experience with others, but not so much that they felt a need to try to make it up using the online discussion. Several others indicated that they used email or phone calls to discuss the class or have social interaction with other students in the class.

When asked about using the board to discuss issues related to the class with the instructor (research question 2) the majority said that they preferred to use email for that purpose. One student replied that email was more efficient for one-to-one communications with the instructor. Another agreed with this observation and added that email was less formal and quicker. When asked for more information about email being quicker another student in the focus group explained that they used email all the time so their email client was always up and running. They felt that it would take more time to go to a discussion board than to use email.

Students in course A made no use of the board to work together or discuss course activities (research question 3). When asked about this some students indicated that again, email was preferred for this type of activity. Some students mentioned using the telephone instead.

While only three students posted messages on the bulletin board, several more indicated that they had read the posts through the quarter. When asked for feedback about the bulletin board (research question 4) these students responded that they liked the way it was arranged, the different forums seemed clear to them and they liked that pictures could be used as avatars. One student mentioned that they liked this type of bulletin board much more than threaded discussions and several students agreed. One student dissented, saying that the threaded discussion seemed to be just as good. Several students mentioned that they had read the posts made by the instructor in the various boards on a couple of occasions but wanted to wait for other students to respond first before they would commit to engaging in the bulletin board discussion. One student mentioned that they were not sure how to use the forum.

Students in course A did not make use of the advanced features of the software (research question 5) such as avatars, clickable hyperlinks or automatic quoting to aid in contextualizing responses to other posts. When asked about these features most students said they were not very aware of them some students reported that these features sounded like they would be useful.

Discussion

Despite reporting that they did feel some sense of isolation or lack of the social dimension that exists in face-to-face classes, few students attempted to use the bulletin board established for the class to help alleviate feelings of social isolation. Students in course A seemed to feel capable of completing the course despite the feelings of isolation or they used other, more familiar means for contacting other students in the class to share experiences or to collaborate on assignments. Students did not view the bulletin board as a means for interacting with the instructor, again preferring to use a more familiar method (email) for this purpose. It is easy to speculate that with the need for efficiency identified by at least one student, and the heavy work load of the course mentioned by others, students did not want to take on the task of learning to use yet another technology that was not required to complete the online course. The bulletin board software was viewed favorably by many students in the class who examined it, despite the low usage of the system.

Participants

The participants in course B were 25 graduate students who were enrolled in a hybrid course in the Instructional Technology graduate program. The majority of the participants were employed full-time, most as teachers. All students had basic computer skills with a few having above average computer skills. Several students in course B had also been enrolled in course A described above.

Procedure

Course B was a hybrid class with four of eleven scheduled class meetings being held face-to-face. This course included textbook readings with associated response questions, a project with a required presentation, and mandatory online discussions. Based in part on findings from the prior course some changes were made to the way the bulletin board was used in this course. Specifically, participation in the online discussion was graded comprising, 31% of the grade. The criteria for grading was established and communicated to students so they would understand the expectations of the instructor. These grading criteria included a definition of indicators of quality posting, including direct responses to and quoting of other poster's responses, thoughtful reflection and the inclusion of information relevant to the discussion from sources outside of the course materials.

Some additional changes to the structure of the course were made in response to findings from the first use of the bulletin board. The instructor demonstrated the bulletin board in the first class meeting, which was held face-to-face and required students to sign up for the board and make an initial post. This was done to provide initial familiarization to the bulletin board and to ensure that all students were able to access the board. Along with this experience the instructor also reminded students in weekly emails to engage in the bulletin board discussions and provided a weekly grade update to communicate to students their level of performance in the online discussion.

The bulletin board was used in course B was designed to answer the following questions:

1. To what extent will students participate in online discussions if they are a graded requirement of the course?
2. To what extent will students make use of an online meeting space to alleviate potential feelings of social isolation?
3. To what extent will students make use of an online meeting space to attempt to interact with the instructor about the course content or assignments?
4. To what extent will students make use of an online meeting space to work together or seek assistance from other students about activities and assignments?
5. What are student reactions to the new discussion technology?
6. Will students use the advanced features (avatars, links, automatic quotes, etc.) of the bulletin board?

Results

Eleven students participated in a post class interview to share their experiences using the bulletin board as part of the hybrid class. This interview took a focus group approach to discuss the structure of the course and the use of the bulletin board in the class. In addition, the bulletin board itself was a source of information to help answer the research questions.

Examining the usage of the bulletin board in course B found a great deal of use by students (research question 1). Student posts were evaluated each week to assign a participation grade for the course. Nineteen students were evaluated as having excellent participation with excellent

participation being defined as multiple postings each week of the course discussion that responded directly to the instructor's initial post or which responded directly to another student's prior post. Four students were evaluated as having good participation, which was defined as at least one post per week of the course discussion that responded directly to the instructor's initial post or which responded directly to another student's prior post. Three students were evaluated as having low participation which was defined as less than one post per week of the course discussion that responded directly to the instructor's initial post or which responded directly to another student's prior post.

All students who completed the course posted on the bulletin board and several students posted in more than one of the forums on the bulletin board. There were 347 posts made by students in the bulletin board discussion. Of these 347 posts, 93% (324) were evaluated by the instructor as being directly related to the course content. The remaining posts were social or off-topic (research question 2). This reflects the fact that the vast majority of posts made by students were in the course-specific forum of the bulletin board. These results indicate that students either did not use the bulletin board much for social purposes to alleviate perceptions of social isolation or that their participation in the course discussions were sufficient for them to feel an adequate amount of social connection to others in the class. When asked about social isolation, some students reported that they did not feel excessively socially isolated in this class. One student offered the opinion that this was because they already knew other students in the class and because there was some face-to-face contact in the class. Some students reported that they still missed social interactions and that the forum couldn't completely make up for this lack. However most students indicated that they did not feel a need to use the bulletin board for social conversations, and as was the case in course A, some reported preferring to use email or the phone for these types of conversations.

A significant number of the posts in the bulletin board were made in direct response to topic starter questions posted by the instructor, which indicates that students will use this type of communication to interact with the instructor about course content (research question 3). However relatively few posts were made to request information about assignments. Students still tended to use email as the primary communication tool for direct interaction with the instructor.

Students generally reported that the bulletin board was a good opportunity to share in-depth thoughts about course material and related subjects and that the technology adequately supported this purpose in the class (research question 5). Some participants related that the bulletin board was actually better than a face-to-face discussion because it was obvious that some people put more reflection and time into writing a more thoughtful response than would be the case in a face-to-face discussion. Some students agreed that they had been able to take more time to formulate responses to discussion topics, which helped improve quality. Students also reported that they appreciated the asynchronous nature of the bulletin board as opposed to a discussion in a face-to-face class or even a live chat because it gave them more flexibility in choosing interaction times. Several students also said they appreciated the opportunity to participate in the class online via the bulletin board because it saved them considerably in terms of travel time and gas money.

It was natural for students to compare the bulletin board system used to support discussions in course B to previous experiences, specifically the Blackboard threaded discussion. Common themes emerged including that it was much easier to respond to one person using the bulletin board than it was using a threaded discussion because of the ability to quote the post to which the response was being made. Several agreed that this made it easier to see the relationship between the original post and the subsequent post because of the way it was displayed in the bulletin board. Some students mentioned the way ranking of topics by views and responses as helpful, making it easier to keep up with the discussion without having to scroll through numerous lines of posts. In general the bulletin board was considered by students in the focus group to be easier to use than the Blackboard threaded discussion.

One of the features of the bulletin board that was used by the instructor was the pinning of weekly discussion topics. This kept these instructor initiated topics at the top of the post listings. Students were asked about this and almost universally students reported that this helped because it prevented posts that students thought might be ungraded from overpowering the course discussions that they were sure were evaluated. Clearly the stimulus for participating in the bulletin board in this course was the fact that their discussions were graded. One student said that keeping this post on top helped to make it clear what the instructor felt was important.

Of the 25 students who participated in the class, 18 used a picture of themselves as a board avatar (research question 6). In addition, many other posts made use of advanced features of the bulletin board software by including such things as hyperlinks and automatic quotes of other posts.

Some discussion about the instructor's role in the course and in the bulletin board occurred during the focus group. This discussion pointed to the importance of the weekly grade report which included an evaluation of each student's weekly progress in the bulletin board as being extremely helpful to students because it let them know if their participation in the board was being noticed by the instructor and at what level they were performing. Most students indicated that it was important that the instructor be present in the discussion although the instructor did not have to be in control of the discussion. Many agreed that it was essential that they feel that the instructor was looking at the discussion to grade it and be involved. However, some students reported a desire for more instructor interaction in the bulletin board than there was. Some students wondered about having the opportunity to take on moderator roles in the bulletin board for some specific topics while other students reported that they felt this might be stressful. With very few exceptions, students indicated that grading participation in the bulletin board stimulated their use of the board. One student summed it up by saying, “ungraded equals lurkers not posters.”

Discussion

Clearly, students are more likely to participate in an online discussion if their participation in that activity is a graded part of the class. This seems in contrast to experiences in face-to-face classes where ungraded discussions are common. This may be due in part to some online students’ quest for efficiency in online classes. That is a tendency for students in online classes to seek clarity in understanding the requirements of the class, and upon knowing these, to focus their attention on them to the exclusion of other possible courses of action in the course. Because the extent to which students interact with each other using a bulletin board system is probably most associated with what will be graded the course grading system can be used to encourage students to interact on course assignments or on collaborative projects. For this reason instructors and course designers should be careful in crafting course grading requirements to ensure that students are not forced into using technologies that are not best suited for the task. On the other hand it is also important to know that the way the course is graded can be used to require students to use technologies that are suited for the task, even if students are not at first proficient or comfortable with such use.

Students do seek interaction with their instructors. However a public forum such as a bulletin board may not be seen by students as the best communications medium for this type of interaction, especially if a more personal communication medium exists. Students in this study used email to interact with the instructor about course content, assignments and other issues much more than they used the bulletin board for such purposes. This may be a result of the importance the instructor of these courses placed on rapidly responding to student email. It would be interesting to see how student use of a bulletin board might shift to include more interaction with the instructor if the instructor placed more emphasis on responding rapidly to bulletin board posts than on email.

The students in this study seemed to adapt to using this new technology with little difficulty and in general students found the bulletin board as good or better than previously used technologies such as threaded discussions. Students pointed to some of the advanced features of the bulletin board system, such as picture avatars and the ability to easily quote previous posts as reasons this was the case. In general students reported that the bulletin board used in this study was effective for supporting course discussion.

Conclusion

The usual cautions about overgeneralization of results from a small sample such as this are in order here. The participants in this study were busy professionals with full-time jobs and seeking an advanced degree. Because of this they may be more interested in the efficiency that asynchronous online educational experiences offer than other students. Additionally the results of this study are largely descriptive of the experiences of these students in two classes and should be judged accordingly. Further, the instructor of the course is a proponent of the use of bulletin board software in online courses and the enthusiasm of the instructor for the medium may have influenced the students in the courses. With these qualifiers in place this study still offers some information of use to online instructors, course designers, or those who support the technology infrastructure of online classes such as the course management software.

This study describes the use of a bulletin board software system that has some significant advantages compared to previously used systems such as the threaded discussion. Not the least of these advantages is the power the software gives the moderator/instructor to shape the discussion through the ability to pin posts to the top of the list, delete or move posts. Additionally this software gives participants the ability to modify their posts by editing them. Other advantages include the ability to use photos as avatars, which help other users visually associate the poster with a person.

If there is any disadvantage of using a bulletin board system instead of a threaded discussion it is that this software is not yet built into course management systems such as Blackboard. This means that instructors who wish to make use of these more advanced systems must install them on their own servers or find support for the installation of this software within their technology support infrastructure. This type of software is available from the open source community free of charge but this type of software does require someone familiar with server operation to install and maintain. In some institutions there is little incentive for those charged with managing online course infrastructure to use software other than the licensed course management software that is already available. Thus it may be some time before this type of bulletin board software is available to all online classes. However, there is little doubt that as these systems continue to mature the advanced features of bulletin boards described in this study will make their way into these course management systems and thus into more online courses.

Future research related to the effective use of bulletin board software in online learning should include, methods of grading online discussions, the role of and importance of advanced features on Social Presence, effects of advanced features on instructor immediacy, and effective means of structuring student engagement in and use of bulletin boards.

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Editor's Note: This paper is useful for those who write and publish e-books and those who are adopting them for their classes. In learning communities where students are computer literate and have easy access to computers and networks, there are cost and logistical advantages. However, digital rights and copy restrictions may present problems for some users.

Incorporating Digital E-books into Educational Curriculum

Freda Turner

Abstract

The first books were probably the Egyptian scrolls of papyrus that provided lineal content to readers. Today (2005) the Internet technology presents the *Internet lifestyle* that has introduced electronic or e-books that can enrich learning experiences. E-books have an advantage over traditional books in that they offer hypertext linking, search features, and connections to other online databases enhancing data comprehension. Printed books may become artifacts like the papyrus documents as interactivity lifestyles continue to become the norm. While leaders of all educational organizations might benefit from using e-books, educational leaders of online and distance education environments may have a competitive advantage at implementing e-books into the learning culture. Distance education users tend to be confident and agile in computer skills. Advantages of e-books over traditional texts and suggestions on how to incorporate the use of e-books into a learning culture are provided. Using e-books can turn passive lectures/reading into interactive collaborative opportunities to aid information retention.

Introduction

From Papyrus to e-Books

Early civilizations conveyed data using symbols and inscriptions on stone, clay tablets, and pottery. Later wax was used to record information as the markings could be scraped off and new messages could be recorded. The first books were the Egyptian scrolls that used papyrus products native within the Nile region. The Chinese have been credited with introducing paper from bark and the first printing ("A history of book", n.d.). Today (2005), the Internet technology presents *Internet lifestyle* opportunities that has morphed into e-books and distance education to enrich learner experiences and can prepare learners for the digital work environment.

Distance education has become the focus of many academia and business organizations in response to the need for an educated, competitive workforce. To guarantee success in the digital workplace, individuals and organizations must remain flexible, acquire new skills continuously, and identify additional ways of managing knowledge and information. One such new strategy to ensure an educated workforce is to incorporate the use of e-books. *Digital textbooks or e-books are reproductions of traditional, printed textbooks that appear on-screen by means of an Internet connection (Segal, 2004).* In the next 20 years, more textbooks are projected to be converted into the electronic format with the continued growth of online and distance education.

For years, electronic versions of newspapers and journals have been available. Electronic books or e-books, too, are becoming popular. An e-book is a book that is converted into an electronic format rather than printed as a paperback or hardcover. In March of 2000, "Stephen King released his first e-book, *Riding the Bullet*, which was downloaded more than 400,000 times in the first 24 hours" (BookFlash, 2000, para. 1). Then, Scott Adams, the creator of the popular Dilbert cartoon strip, acknowledged, "eBooks have been a substantial portion of my total book sales. I've reached

a lot of readers who don't like the higher cost of hardcover books." (“Top Selling e-books”, 2004, para. 5). In 2004, e-books represented the fastest-growing segment of the publishing industry (Gall, 2005).

City libraries are investing in e-book collections. Wilson, (2005, p. 33) published, "The e-book will be the next new thing in library sciences." The state of Illinois has 20 libraries offering 24/7 e-book access to library patrons (“Digital Books available online library”, 2005). Best sellers include fiction, non-fiction as well as classics. Library patrons can access the free reader software, select titles, download the digital book and the file expires when the loan period is over. This frees the digital loan opportunity for another patron. If an e-book is not available due to a loan-out status, a patron can have their name placed on a waiting list and the patron will be notified by e-mail when the digital rights access to the book become available. Brooklyn Public Library has over 1,000 digital books allowing patrons to download from home computers to obtain up to 15 titles at a time for research or reading activities. “In the first 10 days of the e-book collection addition, over 50% of the titles were checked out” (“Brooklyn Public Library”, 2005, para. 5).

Publishing and distributing organizations are also reporting a high interest in e-books offering scholarly publications, reference materials, novels, professional and popular titles. E-bookmall.com has over 125,000 titles available providing virtual access to books available to anyone with the Internet and a computer (“E-bookMall, 2005). Many publishing organizations will price a set of books for a flat fee that is much lower than purchasing books individually while many new titles are emerging as e-books only. The Open e-Book Forum (“E-book best seller list”, 2005) identified the 2004 Top Selling e-books as *The Da Vinci Code, Angels & Demons,* and *Deception Point*- sales of these titles in e-formats were almost equal to the hardcover cousins (“Top Selling Books”, 2005). E-books can be modified to reach various age groups changing the language level and degree of violence.

E-books are becoming a high interest item in many educational institutions and especially in the field of distance education where students may be from different continents. The e-book technology is easily accessible and many educators acknowledge the variety of benefits of e-books. E-books in the educational system provide advantages over the traditional books.

Advantages of e-Books

1. Students are able to download e-learning text materials 24 hours a day, 7 days a week in a matter of minutes. The instant availability reduces costs associated with delivery, shipping, shelving, and storage as well as problems associated with unsold or unwanted books. Another advantage of many e-books to students is the capability to click on any word the learner does not understand and immediately the definition of the word appears. New reading tools provide opportunities to highlight the text and jot notes in the book margins. Additionally, music, sound effects, animation, pictures, hyperlinks, and supplementary materials can be embedded in an e-book providing a richer and diverse learning opportunity. For example, Lison, Gunther, Ogurol, Pretschner and Wischnesky (2004) introduced an e-book called *Vision2003* for medical students. *Vision200*3 allows students to interact with graphical representations of body parts to aid in learners understanding of the human body. Other e-books have been published for interactive use of electrical and computer engineering students offering a learning opportunity that touches several senses (Principe, Euliano, & Lefebyr, 2000). Other examples include providing the learning opportunity for elementary school children as they observe 3-D geographical maps or interactively participate in an archeological dig in an e-book format. Professionals like an Air Traffic Controller might observe how storm conditions influence landings of aircraft with digitized viewings.

2. Shelf life of books might be another financial consideration by school administrators. Johnson (2004) published, "Paper books disintegrate. They go out of print. They're expensive to produce, bulky to store, and back-breaking to move. Their very physical nature means that access to them is limited" (p. 44). E-books offer a longer shelf life because they can be updated electronically vice reprinted/redistributed.
3. E-books can be printed on one's printer should a learner desire printed pages. One can print the whole e-book or just the parts of interest. If one loses a computer hard drive or experiences technology problems resulting in the loss of e-text materials, most publishers will replace free of charge. This would not occur if a traditional textbook were stolen or lost.
4. E-books are environmentally friendly because there is a reduced need for paper, commercial inks, printing chemicals, less petroleum products, and associated transport vehicle resources. A 2005 article in *Inside Higher Ed* identified that eight colleges are offering e-textbooks at 33% below the normal cover price. "It's about giving students a cheaper option," said Jeff Cohen, advertising and promotions manager ("Inside Higher Ed", 2005, Aug 12). The eight participating colleges are Princeton University, Portland Community College, Bowling Green State University, the University of Oregon, Utah, Georgetown College in Kentucky, California State University at Fullerton, and Morehead State University ("Inside Higher Ed", 2005). University of Phoenix Online, the largest private university in the USA has been using e-books since 2004.
5. E-books can be read from the computer or with a hand-held portable e-book reading device. Frequently, e-books are available for purchase before the print version is released on the market.
6. One may customize the viewing experience for one's unique learning needs and eyesight by changing font size and screen contrast vice the standard print copy appearance. Digitized speech options are available to translate printed words in e-books to audible mode and have the text read to learners. Resources are also available to translate verbiage into another language including American Sign Language widening the student recruitment opportunity for educational institutions.
7. Portability is a consideration. A student can carry several titles at once, on a portable reader or memory stick.
8. E-book readers offer the user all the advantages made available by the computer including being able to search for specific terms or pages to find information, and ability to manipulate the content.
9. E-book technology might allow many readers the opportunity to use the same materials simultaneously. Some e-book collaborative tools support file sharing enabling learners to communicate with each another for group assignments while reading the same electronic book in different geographical locations. Learners can ask questions, participate in discussions and debates, and collaborate on projects.
10. Bookmarks stay where one inserts them in e-books which allows the reader the opportunity to begin reading where last finished.
11. Some e-book tools allow readers to copy material allowing the insertion of quotes into their own materials, which could improve the scholarly writing of students.

Disadvantages of e-Books

1. Credit cards are needed to purchase and download an e-book.
2. A computer is required to read an e-book unless one prints out the data.
3. Lack of computer skills may limit access and / or research capabilities for some learners.
4. Access denied due to computer failure or Digital Rights Management restrictions.

Digital Rights Management

Areas to research with the e-publishers is what Digital Rights Management (DRM) standards will be embedded in the e-books. DRM is a term relating to any of *several* technical methods used to restrict or control the use of digital media content. An article entitled, "Digital Rights Management" (2005), addressed this concern as, "Some digital media content publishers claim DRM technologies are necessary to prevent revenue loss due to illegal duplication of their copyrighted works" (p. 1). Some restrictions of Digital Rights Management (DRM) often means the e-book user can only open the e-document on the same computer originally downloaded. A preferred alternative option to learners might be to design the access to e-textbooks with an expiration date that expires within a specified time. This choice allows the learners to work from computers in various locations such as the classroom, library, or while traveling to access materials in a business center.

Incorporating e-Books into an Educational System

Distance education leaders might find it easier at incorporating e-books into the culture, as the learners and faculty tend to be more confident in their computer skills than traditional educational users. Launching an initiative to incorporate e-books into an educational organization should be planned carefully, since it is a culture change. Beer and Nohria (2000) published that 70% of all change initiatives fail despite the best efforts by leaders. Atkinson, (2005) suggested that the rate of failure for some change initiatives could be as high as 80%. Change is not a simple effort. O'Toole (1996) found 33 hypotheses explaining why people resist change. Brassard, Field, Oddo, Page, Ritter, and Smith (2000) stated, "A solution is only as effective as its action plan" (p. 75). The authors noted a good plan as one that documents the requisite tasks, necessary resources, and names of the individuals or change team who would accomplish the tasks. Moreover, the plan would include measures and milestones to assess performance and progress. There should be three phases used when launching new cultural initiatives such as integration of e-books. They are the (a) educational phase, (b) buy-in phase, and (c) implementation phase.

Educational phase

The educational phase should involve a program or campus wide initiative that will describe the advantages of e-books over traditional books using a variety of mediums to inform all stakeholders. Key to implementation is communicating the launch of the incorporation of the e-book initiative to convince all stakeholders about benefits of adopting the e-books. Therefore, timely and repeatedly compelling information about the change for the action team and customers is necessary. Be prepared to discuss the needs from the faculty as well as student's point of view.

Buy-in phase

This is an important phase when launching a new initiative such as an e-book conversion. "Resistance is a natural emotion that must be dealt with and not avoided" (Mento, Jones, & Dirndorfer, 2002, p. 50). The change plan should be framed in such a way so that individuals are motivated to make the change. In addition, providing the stakeholders the ability to give

immediate feedback will help shorten the acceptance of the change effort. The buy-in phase should be lead by influential figures so all stakeholders know the support for the cultural change comes from top levels. Presentations should be made frequently to faculty, students, and administrators. Other suggestions include placing banner ads on educational web sites, sending out emails to all stakeholders, designing computer pop ups, include notes in all school publications, ensure the media supports the e-book launch with news events. The buy-in phase should be launched the semester before implementation. Incentives could be offered during this stage offering such items as free e-books, or subsidize USB flash card memory stick purchases so e-books could be carried on a key chain. Another suggestion is to offer students one free book download for their initial class that uses e-books.

Implementation and Evaluation phase

In addition, once the change team launches and implements the e-book solution, review and evaluation is paramount. This assessment should focus on the customers' acceptance, adoption, and actual use of the e-books over time to determine if the expected change is operating as expected and adjust accordingly. This should be a small task force to oversee the marketing study, increasing the new book collection, and ensure that availability of all e-books are technologically retrievable.

Conclusions

E-books, like online education, are still in their infancy as compared to traditional delivery methods. Distance education community leaders may have a competitive advantage over traditional universities in the ease of adoption of an e-book culture as the faculty and learners in online/distance education environments tend to be comfortable with their technology skills. Benefits of using e-books over traditional hard cover books in academia are compelling in preparing learners for the digital work environment. Selling the idea of e-books into a culture of education is critical in preparing learners for the digital age. Educational leaders should formulate a good launch, buy-in, and implementation plan of action to engage all stakeholders. Change is not a simple effort. Foster and Kaplan (2001) explained that mental models are very difficult to change. Educators have used hard copy books and the change to e-books is a new cultural concept. Quinn (1996) reminded that leading change implies setting a vision and being a motivator in the implementation. E-books provide interactive learning opportunity and I speculate that e-books will be common soon.

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Editor's Note: Web log (blog) software has opened new communication options for business and personal use. They provide a simple means for sharing information and references from any computer via the internet. The RUBRIC model provides six tests for blog viability that are easy to apply, making blogs more valuable for education and business use.

Blog RUBRIC: Designing your Business Blog

Robin Yap, Brent Muirhead, Jeffrey Keefer

Introduction

Blogs are seemingly ubiquitous. Whether for academic, business, or personal use, people have found ways to use blogs for a variety of purposes. Originally created for online diaries and journals, weblogs (commonly referred to as blogs) have morphed into a plethora of uses and features that continue to develop and evolve. Blogs are used to cover political events (Rogers, 2005), publically share information and opinions about nearly everything (Walker, 2005), and are increasingly being used for more formal purposes in academic settings.

What are they? Blogs are software programs that run on servers over the Internet or on a network. They look like web pages, but the difference is that any authorized user can add comments or upload documents and pictures to them. All software is on the network, so changes can be made from any computer that has access to the network. For example, an online blog (which is where most of the estimated 10 million + blogs exist) can be accessed, viewed, or changed from any web browser (such as Internet Explorer) that can access it. This means that blogs can be updated without having any special programming ability or software installed on a specific computer. This makes blogs easy and fast to change, and this appeals to those who have come to rely on the flexibility of the blog design.

Another common component of blogs is the ability for readers to comment and link to comments on other blogs. This dynamic ability allows for communal use of this technology and enables individuals as well as large organizations to publish online.

Background

When you are on a guided tour to a location that you are unfamiliar with, you rely on the expertise of your tour guide to provide you with information that may be of interest to you as you go from one location to the next. Some tour guides are entertaining, others provide very intricate information about a specific subject matter, and still others allow you to participate in the experience. A web log (or blog) can be akin to a tour of specifically chosen Internet sites that may be of interest to the reader. In as much as there are many tour guides to choose from, there are many blogs available for various types of readers. Each blog site develops its own audience-type, camaraderie and even politics amongst the readers; ergo developing their own community.

Weblogs or *blogs* have been defined as a "cross between a diary, a web site, and an online community" (Embrey, 2002). Wagner (2005) takes this one step further by stating that blogs are "conversational knowledge management" tools. This paper will explore its viability in the workplace.

Blog History

Tim Berners-Lee at CERN wrote the first website, http://info.cern.ch/, which was also the first weblog as it pointed to other websites when they first came online. This "linkage to other sites" is one of the characteristics of a blog. In the 1993-1996 timeframe, the NCSA's "What's New" webpage (http://www.ncsa.uiuc.edu/) and Netscape's "What's New" webpage

http://wp.netscape.com/home/whatsnew/ were the next blogs to hold information about other blogs.

Journalists, tech writers, Internet programmers, and developers were among the first to jump in to the blogging world. Blogs like Robot Wisdom (http://www.robotwisdom.com/), Tomalak's Realm (http://www.tomalak.org/), CamWorld (http://www.camworld.com/), and Scripting News (http://www.scripting.com) were widely read and discussed. Articles have been written about the viability of blogs as methods of communication and sharing of information (Oravec, 2003; Oravec, 2002; Clyde, 2005). Blog usage has even permeated corporate organizations (Delio, 2005; IBM, 2005),.

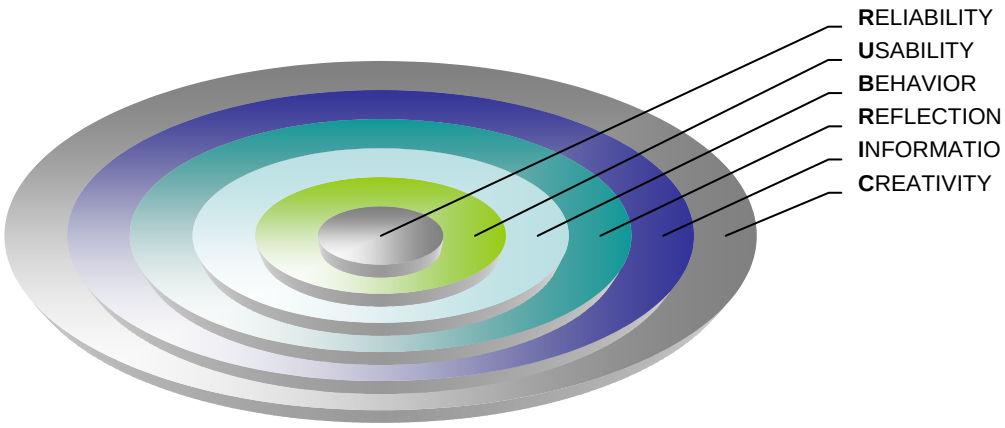

***Figure 1*. RUBRIC model**

Model for Viability

In determining a blog for business use, the acronym **RUBRIC** (Figure 1) reflects the six tests that make up the model for the blog's viability. RUBRIC stands for **R**eliability, **U**sability, **B**ehavior, **R**eflection, **I**nformation, and **C**reativity.

Reliability

At the core of the RUBRIC model is reliability. When reliability ceases to exist, the blog, however aesthetically gratifying it may be, will not be useful in a business context. Reliable sources include C-level executives, industry experts and strategists, and well-respected thinkers in the field.

Usability

A reliable blog can only be effective if intuitively navigable by its target audience. The second layer of this model is "ease of use." A graphic, table, text, and other navigation tools should be appropriately placed to reflect the mission, vision, and goal of the blog. Any decision on pop-up windows, links to other sites, shopping carts, advertisements, font sizes, colors, backgrounds, audio, and use of multimedia software like Flash, should thematically alignment with the business directives of the blog.

Behavior

A layer above "ease of navigation" is the "appropriateness" of the blog. A blog written in the first person can reflect accessibility to the writer while a scholarly written blog shows an authority in the field. There can be many perceptions of blogs and a survey should be conducted to determine if the audience's perception aligns with the corporate culture intended by the blog developers.

When this behavior is inconsistent across all blog pages and/or posting entries, then the "idea" of the blog crumbles.

Reflection

It is important for a blog developer to be flexible in their product. When a poll of the target audience results in confused readers or requests made for increased updates to the blog, for example, the developers should be immediate in their response. "Reflection" wraps the three other layers of this model as it is in this stage where there may be constant flux due to the many external factors affecting the blog's content, appearance, and navigation. Another example would be a merger by the blog sponsor resulting in combining two or more seemingly disparate blogs into a cohesive website. In as much as the blog is updated frequently, so does the design to reflect the state of the business as well as the needs of the audience.

Information

The blog information should always be current and relevant. The main concept of a blog is its ability to be practically instantaneous in its postings. When this inherent blog characteristic fails, the website as a whole becomes ineffective. The sources of information can be very reliable but if the information is not current, audiences do not to use this blog as a reference.

Creativity

The overall layer that surrounds this RUBRIC model is the blog's ability to shine above the rest. The creativity of a blog comes through in the form of the "spirit" of the developers and its writers. The uniqueness of a blog provides a lasting imprint to its readers. When readers use a blog's links to leave the blog without returning, then the site's "hook" is lost. When the blog is noted for its overall refined state, then its creativity edge is engaged.

This six-component blog-model-for-viability to corporate use can be utilized in the form of a checklist, discussion points with developers and project supporters, audience surveys as well as focus group topics. It is important for developers to have a clear understanding of their corporate mission to have a direct alignment with the blog being developed.

Educational Perspectives

Blogging represent a dynamic and growing activity among professionals and students who appreciate blogs for their mix of informal commentary, links to resources and personal touch. Every blog carries a unique character that makes its distinct contribution to the Internet. Downes (2004) relates that "… a blog is also characterized by its reflection of a personal style, and this style may be reflected in either the writing or the selection of links passed along to readers. Blogs are, the purists form, the core of what has come to be called *personal publishing*" (p. 18).

Downes (2004) raises an excellent point about blogs appealing to people because it is an opportunity for personal sharing of life experiences, vent frustrations and offer reflections on a variety of social issues. Contemporary life can be quite impersonal and people long for having opportunities to express themselves to others in a nonthreatening atmosphere. Additionally, blogging offers educators an excellent platform to forge their own professional identity by sharing with other colleagues and debating ideas. The blogging community is a diverse one that transcends any simplistic descriptions. Blogs vary in their purposes but they represent a new intellectual and creative frontier. Farrell (2005) argues that "academic blogs, like their 18th-century equivalent, are rife with feuds, displays of spleen, crotchets, fads, and nonsenses. As in the blogosphere more generally, there is a lot of dross. However, academic blogs also provide a carnival of ideas, a lively and exciting interchange of argument and debate that makes many scholarly conversations seem drab and desiccated in comparison" (B14).

The formal print media through journals, newspapers and magazines continues to supply an important avenue for exchanging ideas within the academic world. Blogs reflect a powerful new communication tool that provides an intellectual leveling effect that invites people who represent more diverse backgrounds. Today's blogs often function as a practical technological format for creating professional bridges between people across and within academic disciplines. Farrell (2005) observes how blogs serve specific knowledge interests and needs:

- Panda's Thumb (evolution)
- RealClimate (global warming and climate science),
- Cosmic Variance (physics).
- Savage Minds for anthropologists
- the Volokh Conspiracy, Balkinization, and Prawfsblawg for legal scholars;
- Duck of Minerva for international-relations theorists; and
- Cleopatra for historians (B14).

Evaluating blogs does not have to be a tedious and time consuming activity. Rather, individuals should consider some basic criteria to guide their selection process. The authors have created the following list of items which can be quickly noted when first visiting a blog:

- **Content** - depth of material, subject area, archives, resources, type of links. Do they meet my research and teaching needs? Does it contain archives of comments?
- **Current information** - Does it update information and resources?
- **Online tone of blog** - Is it friendly? Inviting others to join into the blog? Is a community spirit is evident?
- **Creativity** - Does it promote creativity and reflective sharing of ideas?
- **Accessibility** - Is it easy to navigate to different areas of the blog? Are links to resources / articles working? Can people easily post comments to site?

A superb example of an in-depth blog is Stephen's Web (Downes, 2005) which contains an enormous amount of well organized materials, links and archives. The blog is easy to access and locate material on a diversity of educational and technology subjects.

Teachers who are interested in using blogs can enhance their professional growth by utilizing material related to their specific academic field and share instructional ideas with those who have similar interests. Blogs can be used to share course announcements, readings and relevant information links. As blogs become more sophisticated and organized on the Internet, they will play a larger role in knowledge management for both teachers and students. Teachers should explore opportunities to use blogs in their classes such as having students write reflective journals, create e-portfolios and conduct learning team assignments (Education blogs, 2005)

Why Blogs are useful in business analytics

Blogs were initially used for personal communication and sharing online. People can easily and relatively inexpensively buy a domain name for their own blog and host it (such as the model used by MovableType), pay a monthly fee for a blog hosting service (such as TypePad), or use one of the freely available online services that is supported by advertising (such as Blogger). Buying blog software for corporate use is relatively inexpensive (MovableType has a free unsupported version for personal use and starts at around $200 for a corporate license), or can get large and complicated depending on the number of user licenses or servers that may be purchased and configured for various uses. While all of these models work well for an individual, large businesses and organizations have also found this style of communication and collaboration to be useful for both internal as well as external purposes.

Externally, many small (Geerts, 2005; Lang, 2005; Nardini, 2005) and large organizations are using blogs for marketing and public relations purposes (Delio, 2005). Some examples of official, sanctioned external blogs include the QuickBooks blog (quickbooks_online_blog.typepad.com) and Boeing's blog (www.boeing.com/randy/). While they both are staffed by marketers and public-relations staffers, many other organizations know or even actively support their employees to blog, with notable examples being Robert Scoble of Microsoft (scoble.weblogs.com), Charlene Li of Forrester Research (blogs.forrester.com/charleneli), and even IBM (www.snellspace.com/IBM_Blogging_Policy_and_Guidelines.pdf) and Sun (www.sun.com/aboutsun/media/blogs/policy.html) officially encourage their employees to blog. What better way to project a public face to a company than to have employees blog independently about their work and interests?

Internally, many organizations are also using blogs for internal communication (Chang, 2005), collaboration, and knowledge sharing and management (Wagner, 2005). When these programs are installed on an organization's servers inside a firewall, they allow for a sharing and flow of ideas that is not possible without such technology. Even now, wiki (the step-child of the blog) technology allows for blog-like use with the ability to edit one another's posts themselves (Delio, 2005; Niles, 2005).

Summary

As blogs have increased in popularity and frequency of use, it is increasingly important for those who create and those who use blog resources to consciously determine which ones are substantial and accurate enough for either academic or corporate use. Our RUBRIC model is an attempt to help this process and begin a standardizing approach to blogs. The RUBRIC elements of Reliability, Usability, Behavior, Reflection, Information, and Creativity are intended to lay a foundation from which academics and corporate communicators can begin to build and use blogs knowing their work will be evaluated and assessed using a standard criterion. Blogs are so ubiquitous that a standard evaluative process is increasingly useful for those who wish to make use of the information or discussions on blogs. The RUBRIC model was created to fill this void.

Conclusion and Future Research

The evaluation and standard measurement criterion is a new development for blogs, and as such the RUBRIC model should now be tested and analyzed to determine its completeness. Future areas of research include applying these criteria to academic class blogs, official corporate blogs, and even the distant cousins of blogs, wikis. It is hoped that such quantitative and qualitative research into this online communications medium will bear fruit for those who want to incorporate these methods into their classes and endeavors.

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Research blogs

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Editor's Note: Nurmi and Jaakkola from Finland challenge the conventional wisdom behind Learning Objects in order to develop practical perspectives for their own use in education and training. They focus on current theories of learning to direct development and implementation of customized learning based on Learning Objects.

Problems Underlying the Learning Object Approach

Sami Nurmi and Tomi Jaakkola

Abstract

Learning objects (LOs), generally understood as digital learning resources shared and accessed through Internet and reused in multiple learning contexts, have aroused worldwide enthusiasm in the field of educational technology during the last years. Although learning objects approach offers tremendous possibilities to reorganize and improve educational practices, there are many theoretical problems and practical shortcomings which are usually neglected. In this article some of the anticipated promises of the LO approach is introduced shortly and some of the many underlying problems are revealed. Due to their flexible nature, LOs and LO systems can be used to support all kinds of learning and teaching activities, both sophisticated and reductionist ones. LOs itself are not good or bad, but their pedagogical value is determined through the context of use. Implementation of LOs needs a sound pedagogical grounding, and only using LOs according to the principles of contemporary learning theories can their promises be fulfilled.

Keywords: learning object, LO, instructional design, constructivism, learning environment, eLearning, reusability, pedagogical grounding, knowledge transmission, adaptability, educational technology, learning theory, view of knowledge, view of learning.

Introduction

During the last few years the worldwide interest in the field of educational technology has been placed on learning objects. Learning object (LO) is defined in the IEEE Learning Technology Standard (IEEE, 2002) as any entity -digital or non-digital- that may be used for learning, education or training. However, due to the excessive wideness of the standard definition, LOs are commonly referred as digital learning resources that can be shared and accessed via Internet, and reused in multiple teaching and learning contexts. Although recycling and reusing of (digital and non-digital) learning and teaching materials has been an important part of different educational practices for a long time, LO approach, according to its core idea, offers promises of universal access to reusable online materials. Reuse is based on modularization, so that small, modular LOs can be combined and recombined by eLearning developer, teacher, and learner or even by an intelligent eLearning system.

Although there is a clear lack of empirical evidence on the effectiveness and usefulness of LOs, the LO approach has many eager advocates who believe that the LO approach bears the potential of transforming education into a new level. In the most enthusiastic beliefs, LOs are said to fulfill the long promised rewards of computer-based learning by offering scalable and individually adaptive mass instruction in cost-effective way, which - at its the most extreme form - can even be generated on the fly according to the learner needs by "intelligent" semantic technologies (Gibbons, Nelson & Richards, 2000). As a consequence, huge amount of financial and human resources are invested in developing digital learning materials and eLearning systems worldwide.

Although LOs offer many tremendous possibilities, there are still many challenges to be tackled before LOs can be accepted in the light of current learning theories and implemented in larger scale. Next some of the anticipated promises of the LO approach is introduced shortly, and then some of the many underlying problems are revealed.

Promises of the Learning Object Approach

There are many aspects that make LOs so popular and interesting. According to Wiley (2005), by making educational resources more reusable, LOs promise to fulfill simultaneously three criteria: cheap, fast and good. LOs are said to be cost-effective in producing and implementing, reusable in different learning contexts, and easy to adapt to meet different needs of different users. Typically LOs are understood as educationally useful, completely self-contained chunks of content, which include specific educational objectives they are covering, instructional materials and methods to teach that objective, and an assessment of student mastery of the objective (Wiley, 2005). This way of thinking has led to the prevailing LO approach, which is founded on a traditional instructional design paradigm (e.g. van Merriënboer & Boot, 2005): desired learning objectives are decomposed into smaller atomistic sub-objectives, optimal instructional methods to achieve specific sub-objectives are developed, prescribed instruction and necessary feedback are delivered to a student, student mastery with various factual tests is assessed, and if necessary, the instruction is repeated until mastery is achieved. This sounds easy and effective instructional model, which has attracted especially eLearning developers in military and corporate settings.

The anticipated promises of prevailing LO approach can be encapsulated around the themes of cost-effectiveness, reusability and formability. According to the cost-effective promise, learning resources can be produced, delivered and reused cost-effectively. The fundamental idea is so called learning object economy, which aims to maximize the reusing of existing learning resources and provide critical mass LOs to fulfill the various needs of different teaching and learning contexts. Material sharing is equally beneficial for teachers and learners as well as material producers who can use object-oriented programming to avoid unnecessary redundant work in production. According to the reusability promise, LOs can be combined and recombined in many different ways like building blocks to meet the various needs of different learning contexts and different learners. By reusability it's possible to provide adaptive instruction according to learners' various needs. Adaptive instruction can be accomplish in many ways: teachers can prepare ready-made learning packages to their students by combining available LOs, or students can themselves select the used LOs according to their needs and desires, or adaptive learning sequencing can be generated automatically on the fly with intelligent systems. Reusability sets its own requirements. In order to be reusable in different contexts and interoperable in different eLearning systems, the form and structure of LOs need to be standardized, and its content as much as possible independent of context and pedagogy. The promise of formability increases the possibility to reuse LOs by allowing users (teachers, learners or producers) to tailor LOs in some ways. Through tailoring LOs can be fitted better to various learning contexts. Although these promises sound promising, with closer look there are many problems.

Problems of the Learning Object Approach

Although LOs have gathered lot of attention and enthusiasm, they have also raised criticism among academics (e.g. Butson, 2003; Lambe, 2002; van Merriënboer & Boot, 2005; Parrish, 2004). This criticism has mainly been aimed at the flawed views of knowledge, learning and teaching underlying the LO approach. In addition to these fundamental problems there are still many other questions and smaller challenges (among them questions about intellectual property rights, teachers' ICT skills and willingness to share materials, technical restrictions, metadata specifications etc.) to be tackled before using LOs in larger scale.

Problems with the Underlying View of Learning

In the prevailing LO approach (i.e. typical technology-led instructional design perspective on LOs) there are obvious characteristics of behaviorist and cognitivist views of learning, because of unfortunate emphasis on knowledge transmission (Bannan-Ritland, Dabbagh & Murphy, 2002; Butson, 2003; Wiley, 2003). Typically the main aim of using LOs is to transmit the content from LO to learner, who passively receives and acquires the prescribed knowledge, and reproduce it when required. The underlying view of learning is already implied in the term *learning object*, according to which the learning material and its content are seen as the objects of learning itself, as something that should be taught and transmitted to a learner. According to Wiley (2003) there are three implicit assumptions behind the prevailing LO approaches: 1) A one-on-one instructional model is preferable, 2) Human interaction in large scale learning environments is economically impossible, 3) Automation via intelligent instructional systems is the only viable solution. These kind of trends and instructional methods are drawing on the approaches of programmed instruction (e.g. Skinner, 1954), taxonomies of educational objectives (e.g. Bloom, 1956) and cognitivist instructional design (e.g. Merrill, 1998) of the past decades, which have been considered as flawed and unfruitful in the light of current learning theories.

The reductionist views of teaching and learning underlying the prevailing LO approach are strongly conflicting with the current theories of learning (e.g. constructivism, social constructivism and situated cognition), which consider learning as active, intentional, motivational and social processes of knowledge construction and meaning making (Brown, Collins & Duguid, 1989; Duffy & Cunningham, 1996; Jonassen, Peck & Wilson, 1999). In these theories teaching is seen more as means to support and scaffold student-centered activities, to engage learners with thinking and to provide them environments for collaboration, knowledge construction and reflection (Duffy & Cunningham, 1996). The typical LO approach stresses learning content and its effective delivery to the learner instead of supporting knowledge construction, and neglects the essential nature of learning processes and learner's personal knowledge construction. Thus, the prevailing LO approach takes teaching perspective whereas according to the constructivist ideas the focus should be based on learning perspective.

Problems with Adaptability

The idea of knowledge transmission is evident in the adaptive automated LO systems, which are based on the ideas of engineering-type instructional design. The core idea of such systems is to define beforehand the learning objectives, corresponding learning material packages, their sequence and the instructional activities to achieve those objectives effectively (c.f. Bannan-Ritland et al., 2002; van Merriënboer & Boot, 2005). Then these prescribed learning packages are delivered to learners according to their needs which are charted e.g. with the tests of learners' prior knowledge or their previous learning histories. In its extreme form, automated intelligent system would find appropriate (adaptive) learning materials that could provide just-in-time teaching that fit learner's needs at some diagnosed stage of learning. This kind of prescribed instructional design paradigm is very consistent with the methods of programmed instruction. Butson (2003), when criticizing such reductionist view, has felicitously called LOs as weapons of mass instruction which can ruin education. Furthermore, there is a myth of completeness underlying this knowledge delivery metaphor. Instruction designers seem to believe that LOs and LOs systems are adequate and even necessary for learning. As Wiley (2005) argued, assuming that LOs are completely self-contained resources implies that, aside from their use, nothing else is necessary for learning to occur. All you need is digital LOs and learning management system to take care of the delivery processes: *"Out of the box and into the head, and hey presto the stuff is known"* (Lambe, 2002, p. 11).

Problems with the Underlying View of Knowledge

The underlying view of knowledge in the prevailing LO approach derives from the objectivist tradition. According to this prevailing objectivist view, there exists knowledge that is absolutely true and valid in every context (Lambe, 2002; Parrish, 2004), and these absolute truths can be transmitted to the learners. Absolute knowledge is also supposed to be detached from all of the factors that are related to its original contexts and cultures. In other words, context-sensitive knowledge can be converted into abstract context-independent truth. This objectivist tradition is very contradictory to current theories of knowledge, knowing and learning, which are based on the ideas of subjective knowledge construction and meaning making, as well as dynamic and context-sensitive nature of knowledge. As Savery and Duffy (1995) conclude, understanding is in our interactions with the environment. Therefore understanding and learning are functions of the content, the context, the activity and goals of the learner, and learners can negotiate, evaluate and test the viability and compatibility of their individual understandings. What is forgotten in the prevailing LO approach is that knowledge, knowledge construction and learning are always bound to the learners' subjective processes and contexts where they are acting. Thus it is important to remember that LOs and their contents are not knowledge or learning objectives themselves, but just means to engage learners and give rise to various learning processes and experiences. The content of the LOs can only be regarded as information – as raw material from which one can construct meaningful and mindful subjective knowledge structures. Knowledge is more than information: information itself is meaningless, but it becomes meaningful knowledge when it is interpreted by individual. Information thus becomes knowledge through cognitive effort (Sveiby, 1997).

Conclusion

The LO approach holds tremendous promises but also considerable problems. The problem of LOs is the same than with every new educational technology innovation. They offer novelty, economic benefits and exciting promises that can, if used carelessly, lead to flawed teaching and learning practices that are ignoring the true essence of human learning. LOs itself are not good or bad, but the ways to implement them and the learning environments created around them determine their pedagogical value. Due to their highly flexible nature, LOs and implemented LO environments can be used to support all kinds of instructional strategies, learning theories and philosophies – both sophisticated and reductionist ones (Parrish, 2004). After all, the flexibility provided by the LO approach is their greatest advantage. It enables end-users (educators or learners as well) to use LO innovatively in accordance with sophisticated learning theories and practices to fulfill their current needs.

Essential fact is that LOs need sound pedagogical grounding and local contextualizing around them in order to be successful. Unfortunately, LO systems permitting learner-driven, constructivist-oriented activities have not yet been fully explored or developed (Bannan-Ritland et al., 2002). However, if used in keeping with the ideas of contemporary learning theories and introduced problems in mind, LOs can offer interesting new possibilities to implement constructivist learning environments and engage learners with meaningful learning activities. Therefore every educator need to critically evaluate the way LOs are used, and reflect what kind of teaching practices – and more even importantly, what kind of learning activities – they are promoting by using LOs.

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