Escaping from the crisis in Web-based education: an evaluation of the online communication facilities used in conventional courses

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ABSTRACT: The Internet provides rich communication tools that support one-to-one and one-to-many communication modes that result in knowledge media. In this study, asynchronous communication technologies, which were embedded in the BULMS Learning Management System, were used to support the learning of campus-based students. Class activities of four undergraduate courses were intensively supported by Web-based facilities; this was comprised mostly of online fora, discussions and e-mail. Following this implementation, students' satisfaction was measured with a sample of 58 students. The data showed that most students responded positively to the asynchronous aspect of the online class discussions and feedback they obtained. Most participants in the study also favourably perceived certain features of the Internet Interaction Tools (IITs) as a communication form, and preferred that these tools should be used in addition to face-to-face instruction and dialogues, and not as an entire substitution for it.

KNOWLEDGE MEDIA

The convergence of current technologies provides the infrastructure for transmitting and storing information faster and cheaper. However, for information to be used in gaining knowledge, the right environments for collecting, storing, disseminating, sharing and constructing knowledge are needed. Such environments are called knowledge media and bring together the telecommunications, computer and networking technologies, learning theories and cognitive sciences in order to form meaningful environments that provide for a variety of learner needs [8].

The World Wide Web is one such technology that provides access to valuable educational resources, such as e-mail, e-groups, bulletin board services, audio conferencing, videoconferencing, e-journals, search engines and databases. The Web is also used to deliver online instruction or support conventional courses. However, the effective online delivery of instruction depends on the fast and timely delivery of instructions in learning environments that cater to students' academic, administrative and support needs [3].

Learning Management Systems

Learning Management Systems (LMS) are employed to provide knowledge media for online instructions so as to support or enhance conventional instruction. They also provide for the functionality and organisation of learning resources that can be grouped and/or shared as learning objects. By using Internet technologies to manage the interaction, learners and learning resources, the LMSs maintain a dynamic system that gathers information on both learner/trainee performance and the functionality and efficiency of the learning resources available. Such information is essential in order to obtain a clear picture of the overall learning and teaching process. Any discrepancies, problems that affect learning, as well as a lack and/or shortage of resources and facilities can be detected as the system provides for the feedback through self-assessment and prompts action for maintenance and improvement.

LMSs also provide for academic, administrative and support needs so that students can plan, access, launch, receive information, register for a course(s), login, share some general purpose tools, and communicate with instructors and/or other learners.

THE CRISIS IN WEB-BASED LEARNING ENVIRONMENTS

Many commercial and some public LMSs are available that purport to provide knowledge media. However, several obstacles may be encountered when delivering online instruction or supporting conventional instruction. This is elaborated on below.

Technology before Pedagogy

Today's technology market is feature-oriented and companies develop products that compete with the quality and quantity of the features that may or may not meet the needs of educators. Computer technologies are usually all-in-one by nature and a commercial product tends to be cumbersome or difficult to customise, as they are designed with the principle of one-size-fits-all [16].

Educators, on the other hand, usually go for technologies that are proven and cheaper. Most of the time, cheap and simple technologies provide the answer for their needs. How the pedagogical design exploits the features of the technologies supersedes the potential technology on offer [3]. Therefore, educators should put pedagogy before technology and choose

or develop tools based on their pedagogical needs. Such tools are essential, but not sufficient, for creating knowledge media.

LMS and Content Development Systems

Learning Management Systems markets remain immature, with widely varying sets of products and diverging views about what systems should do and where the markets should be headed in the future [6]. Major universities and corporations tend to have online education and training services groups that develop in-house learning systems, resulting in some 434 different Learning Management Systems available [18].

An easier approach can be to license complete LMSs from vendors. Small enterprises tend to contract with turnkey providers that specialise in assisting faculty with the conversion of their course content to Web pages! Technology is easier to find and obtain; however, institutionalising the technological facilities can be difficult. Any customisation of vendor-made LMSs is usually expensive and generally as time consuming as developing a new LMS with the additional difficulty of adapting existing organisational databases and knowledge management software. Getting to know vendor-made complex systems, such as LMSs, and training staff to administer and maintain is costly and time consuming. Content development systems present either very sophisticated tools or very simple templates for authoring knowledge media. In order to produce sound knowledge media, authors have to work long hours, develop new skills or work with an experienced programmer or scriptwriter.

Graphic Manipulation Tools' Requirement for Special Hardware and Expertise

Despite the fact that the equipment utilised to produce knowledge media with more professional components like graphics and video is more affordable nowadays, such tools still require considerable expertise for use.

Academics' Dilemma with Distance Learning

The idea of learning taking place without the physical presence of a teacher is disturbing to many academics. Such prejudice is very common and requires evidence to convince them otherwise [15]. Those academics who have such a bias may approve of others taking such courses, and they may even teach online, but they still consider that online learning is amiss of the desired quality.

Unreliability of Web-based Measurements and Evaluations

Online assessment is essential for knowledge media to provide feedback to students and on the course. However, certifying the learner on competences he/she has acquired through the learning experience still can only be determined with a proctored examination. Non-proctored online assessment cannot be verified and is thus unreliable. Many people and institutions consider grades in online courses as superficial, this leads to the lack of recognition of distance degrees.

Adults Not Used to Reading and Studying Materials Online

Many adults have problems with screen-based information perception and do not have online study habits. This makes setting online instructional strategies difficult.

Long Hours at a Computer Screen

Having to spend long hours in front of computers full of unusable screen objects may be harmful for individuals.

Limited Digital Resources in Libraries

Since libraries, a must for learning, are still short of resources like e-journals and e-books, students in online modules may lag behind when compared to on-campus students.

Market Pressure on Universities

Software companies and marketing business force universities to use new technologies in learning and demand the implement-ation of e-learning. This requires universities to restructure sources and procure new hardware and software for e-learning.

Limited Number of Experts in Developing Distant Courses

Courseware development is a professional activity that requires a group of experts. However, the number of individuals who are educated in instructional design, courseware development and media design for instruction is limited. This may manifest itself in poor materials that are prepared for online instruction and embed inappropriate or inefficient instructional strategies.

Limited Laboratory Facilities for Applied Disciplines

Effective learning requires connecting the tacit knowledge with explicit knowledge that requires practice. Off-campus students, especially in the applied disciplines, need laboratory work and facilities for practice, yet those sources are not easily accessible. This makes online modules limited in their practical application.

Unequal Opportunity for Online Education

The high cost of online instruction may dissuade some institutions to develop, and individuals to register in, online programmes or courses. This makes going online still an option for the *haves*.

EXTENDING FACE-TO-FACE INTERACTION WITH INTERNET INTERACTION TOOLS

Current interest in using the Web for educational purposes coincides with the increased use of different methods of teaching and learning at universities and with the increasing use of the Web to deliver courses to internal and external students [9]. The academic community is reaching out to join with educators in the creation of new information resources and instructional materials.

Teaching is no longer a knowledge transfer task. However, it is a mediating process where the instructor aids and guides students to construct knowledge with the help of educational technology. University instructors should take a professional approach to teaching. They need to know more than merely their subject; they need to know different styles of teaching the subject, how students perceive the subject, the misconceptions that students may develop and how students develop metacognitive skills. Academics should change the way they approach teaching as knowledge, students and supportive technologies change.

Universities should not only work on producing more environmentally friendly, economical and productive systems, they should also concentrate on learning with technology in order to improve the quality of education and training [2][11]. Serdiukov has stated that *a distance higher educational institution should be able to satisfy any request by a current or potential student* [19]. A school providing distance education has to contain and offer all possible materials, tools and support for the student. Basically, only the most comprehensive system will survive the competition and test of time. Considering this, those universities that run and support learning and teaching activities over the Web can easily integrate their current tools, databases, record keeping facilities and intranets to distant support and learning resources to be developed in-house.

Social interaction provides mediated interpretations of experiences and much of what is learnt about the world depends on communication between individuals [21]. Since students can use chat rooms, e-mails, fora, listservs or threaded discussions to communicate with each other and with their instructor, the social interaction aspect of constructivist theory can be incorporated into the instructional settings [13].

Schools need to promote a range of approaches for students to communicate and generate meaning through resources placed on the Internet. Educators should view Web-based learning as a continuum that ranges from supplementing in-person instruction to programmes that are completely online. Teachers should no longer have to worry about students grasping every concept as it is thought in the classroom, since the Web-based education can go home with them and learning can take place outside the classroom. Given this, teachers must create effective and engaging spaces for Internet supported learning [4][12]. Therefore, it is vital to get students involved in small group exercises that allow them to teach each other instead of passively listening to the teacher through the entire instruction [10][12]. This would force group members to value the role of their peers in promoting each other's learning and recognise the importance of peer relationships in establishing a climate of learning in both face-to-face and online learning environments [5][10].

A number of articles have reported on the use of Internet communication tools as a supplement to the teaching of university courses [5][14][20]. Collins and Murphy found that online discussions were less productive and more difficult without having first established rapport with other group members in a face-to-face setting [7]. Similarly, Bourdeau and Bates discovered that online collaboration between students was an essential component of the activities of course participants, who had to join forces so as to learn more [5].

Applications of the Web are most often designed for open learning and off-campus settings among students working independently and in isolation. Although there may be many obstacles to realise completely Web-based courses, less attention is paid to instructional settings on campus, despite the significant learning opportunities offered by the Web. There are many entirely online courses already running and many companies provide their staff with Web-based training. Conventional campus-based university courses can also benefit from Web sources, especially online communication and interaction facilities. This study aimed to evaluate those online communication facilities extensively used in conventional courses.

EVALUATING ONLINE COMMUNICATION MODULES OF WEB-SUPPORTED COURSES

Methodology

The Department of Computer and Educational Technology at Bogaziçi University, Istanbul, Turkey, developed its own Learning Management System called BULMS [1]. The Department also supports some of its courses through the LMS.

In the autumn 2002 semester, among the 200 campus-based students enrolled in courses of the Department; 96 students took four departmental courses that used the LMS. The four courses, all undergraduate, cover information technology, distance education, instructional design and two sections of instructional materials development. In these courses, students attended classroom lectures, seminars and laboratory activities, and visited the lecturers outside class hours. In addition to the conventional classroom activities, students enrolled in the courses online, viewed some course readings, downloaded course materials (handouts, programme codes, compact multimedia lesson materials), participated in course forums to discuss course related issues, answered online quizzes, received course and Department announcements and news, voted for seminar polls, accessed their grades, and communicated with peers and lecturers.

Students were asked to evaluate various issues after the completion of courses in 13 weeks. Students evaluated five different aspects, including: instructor, instruction, learning, tool usability and learners' effect. Data was collected with a questionnaire developed for the study that used and adapted the guidelines outlined in Schneiderman [17]. The questionnaire consists of 13 items and a rating scale. The reliability coefficient (alpha) of the scale was estimated to be 0.93, demonstrating that items in the test consistently measure the traits of the test aims.

In addition to these tools, the first author organised a two-hour meeting with 10 students, asking them to share their experiences and demands from the online supported courses. The rating scale used a Likert-type rating scheme (five-point) based on the suitability and contribution of the tool for learning. The scale consisted of 30 items; its key is as follows: (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, and (5) strongly agree. The questionnaire and the rating scale were placed on a Web page and announced to all 96 students enrolled in the four courses. In total, the sample comprised 37 female and 21 male students (n=58), who answered the data collection tools within one week of completing their respective courses.

Findings

Most students rated their experience with the Internet communication tools as either *casual* or *experienced*. Only a few (n=4) rated themselves as *novice* users, and nine as *expert* users. Most students in the sample accessed the Internet on campus or in the dorm, with one-third of the sample accessing the Internet mostly at home. In terms of Internet access time, one-third of the sample accessed the Internet once a day, 24 students access the Internet several times a day, 12 of them accessed the Internet once a week, while only two students accessed it rarely. Checking e-mails demonstrated similar rates of Internet access rates: six rarely, 15 once a week, 21 once a day, 16 several times a day.

The rate of checking Web-supported course sites was evenly distributed: 10 rarely, 22 once a week, 20 once a day and six several times a day. Half of the sample either rarely used e-chat/instant messaging or never used it; 15 students utilised e-chat once a week, while 14 students used it at least once a day.

However, e-chatting with friends regarding Web-supported course(s) did not take place very often: only eight students used this facility everyday. The sending of e-mails to friends took place more often, with almost one-third of the sample stating that they sent at least four mails regarding Web-supported course(s) to friends.

The average number of posted messages to the discussion board/forum of Web-supported course(s) was five; while 13 students posted to boards at least once a day, 14 students posted once a week, 18 posted rarely and 13 never posted. The Web log files of the used learning management system confirmed the last data.

The last 30 questions of the data collection tool aimed to gather information on five key topics, namely: instructor, instruction, learning, tool usability and the effect on learners.

Tool Usability

Students enrolled in the course online, an additional procedure of their university-wide course registration. Most students considered the online course enrolment easy and found the submissions of assignments to the lecturer well supported in the courses. The perceived-level of experience with Internet communication tools did not affect students' satisfaction rate in using the tools ($F(0.05, 3.54)=2.650$, $p<0.058$), showing that different experiential backgrounds does not meaningfully interact with the user's satisfaction; this may be due to extreme easiness in using Internet communication tools.

Two-thirds of the sample found the communication tools in the Web-supported courses to be useful, 20% of the sample were neutral about them, while 10% did not find them useful. The rate of student-student communications using online tools was unsatisfactory: only one-third of the sample indicated that other students were helpful through online communications. However, most students found the online announcement facilities of the course(s) to be helpful.

Instructor

Two-thirds of the sample agreed that the instructor(s) was successful in helping and mentoring through the Web communication tools. Most students found the lecturer(s)' use of online tools in the course(s) to be satisfactory. Although two-thirds of the sample considered the lecturers' response to the students' e-mails timely, one-fifth of the sample failed to judge it, but only 5% did not find the responses to be timely.

Most students thought that e-mails to the lecturers and the boards were evaluated objectively. Two-thirds of the sample found the lecturer(s)' approach helpful in overcoming any frustration of online learning, but 17% of the sample were still frustrated by online learning. Over 50% of the sample were satisfied with the replies from the lecturer(s) to their questions through e-mails, although 14% were not and 28% were unable to judge it.

Instruction

Most students were satisfied overall with the Web-supported course(s). More than half of the sample found the Web-supported course(s) easier relative to their other courses, yet a quarter of the sample found these courses harder than the other courses.

The number and quality of online activities were appraised as being adequate by half of the sample; however, the other half found them to be inadequate. Similarly, half of the sample found the available online communication tools and the platform sufficient in supporting collaborative working of a number of students, but it was found to be insufficient by the other half.

Learning

Two-thirds of the sample indicated that they considered the exploration of contents to be facilitated by the online activities and found the online tools in the course(s) to be helpful to the learning process. About half of the sample expressed that the feedback given to their online comments by others were helpful in understanding the content. However, one-third of the sample was neutral about the value of the feedback.

Effect on Learners

Two-thirds of the sample felt that doing online assignments/homework in Web-supported course(s) was an enjoyable experience. Forty-six percent of the sample liked reviewing and commenting on the content posted by others in the course(s), although 10% did not like those activities.

In terms of the sample's observation on students' attendance and participation in the online discussion sessions, two-thirds of the sample considered it satisfactory, while one quarter was unable to judge over this issue. Also, two-thirds of the sample were satisfied with their attendance and participation in both the class sessions and the online discussion session. In this line, more than 50% of the sample expressed that they felt more confident in expressing opinions at online tools than face-to-face communication in classrooms, but 20% of the sample felt less confident.

Furthermore, while one quarter of the sample found the online tools in the course(s) to be time consuming, more than half of the sample did not agree with them. With regard to the sample's preference in using audio and videoconferencing facilities to interact with classmates and lecturers more, the preference rate of those facilities changed between 30% (for video) and 40% (for audio). Overall, most students indicated that the Web-supported course(s) they were enrolled in positively changed their approach towards distance education.

The data was triangulated with an informal meeting with students that lasted about two hours. The first author had an appointment with ten of the Web-supported students (three female and seven male) in a classroom. The author asked students about how well their courses were and to what extent their learning was supported through the Internet Interaction Tools (IIT) and the Web. Their responses confirmed the questionnaire and the scale data: students expressed that understanding the content was facilitated by the online activities and that they found the online tools generally helpful

to learning. They mostly complained about the slow speed of Internet access, the small number of computer-based instructional software and the heavy workload in the courses. Some indicated that they initially had orientation problems in Web discussions but overcame this later.

Two students, generally silent when in class, confirmed that the instructor guidelines for Web activities and compulsory participation enabled them to interact with peers more. This reinforced Fisher's research, which noted that required participation is a good way to ensure equal participation, and that whenever a WWW discussion tool was used, discussion guidelines were necessary [10]. Further, similar to Tiene's findings, most participants in this study favoured certain features of the IIT as a communication form, and preferred that these tools should be used as an addition to face-to-face instruction and dialogue [20].

CONCLUSION

The Internet provides rich communication tools that support one-to-one and one-to-many communication modes. In this study, the instructional materials involved open-ended investigations and learner support by means of the Web and IIT. Asynchronous communication technologies allowed students time and more opportunities for reflection in building meaning and knowledge. The students' responses confirmed the data of Oliver, Omari and Heringtonet, who found that structured Web and IIT could support an instructional setting to encourage cooperation and reflection among students [14].

This study suggests that, in order to benefit more from IIT in facilitating learning, key issues need to be resolved. Firstly, the Web-based and supported instruction problems, as outlined in the second section, should be resolved; this requires introducing every facet of this new paradigm of learning and teaching to educational authorities. Secondly, the speed of Internet access needs to be accelerated in order to provide a better communication platform. Thirdly, high quality instructional software should be designed and embedded in courses to facilitate an exploratory type of learning. Fourthly, instructors should receive training on how to employ Internet interaction tools in instruction and balancing students' workloads in Web-supported courses. Finally, there is also the need to conduct further research studies on the interaction between the support of Web interaction tools and learning issues, such as study type and learning style.

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