

Effective Use of LMS: Pedagogy through the Technology

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Abstract: This paper aims to answer one of the most common questions asked in Educational Technology is that if the media used can restrict/enhance the teaching approaches or if we can adopt a variety of approaches regardless of media we use. To do this, the question is discussed in the scope of a widely used media, Learning Management System because there are variety of Learning Management Systems which have different capabilities such as Sakai, Blackboard, Intact and Moodle. The author advocates that primarily method, the presentation way of instruction, influence the teaching/learning process not media. On the other hand, it does not mean that media, the way of delivery instruction, is not important; media also support teaching process but you can use alternative media to make the same effect. For that reason, media selection should be done by taking into account several factors such as faculty; learner readiness to use selected media; content; number of learners and instruction time.

Introduction

Improving teaching and learning process is the educators' aim and technology is seen as a prominent factor that can help them to make it reality. Especially, emergence and advancement of the Information and Communication Technologies (ICT) made teaching activities more dependent on technology. However, the history of instructional technology shows that technology does not provide improvement in learning by itself but pedagogy is an important issue that can affect teaching-learning activities. The author claims that pedagogy should be taken into consideration firstly to enhance learning. On the other hand, in this paper the role of the technology as a supporter to pedagogy should not be ignored. For that reason, the roles of the pedagogy and technology while using an LMS in a course are discussed under four main headings as "LMS and Capabilities of Different LMSs", "Pedagogys as the Main Issue of Instruction", "LMS Technology as a Supporter of Pedagogy for Effective Learning" and "Usability Issues in Different LMSs"

LMS and Capabilities of Different LMSs

In this part of the article, the definition of the LMS and place of the different LMSs in the market are explained. Also, the mostly used LMSs such as Sakai, Moodle, Blackboard and Intact LMSs, their similarities and differences are presented.

There are many online learning environments based on different pedagogical philosophies and they have different features such as discussion forums, drop boxes for assignments, assessment tools and student tracking facilities to facilitate learning (Winter, 2006). One of these environments is Learning Management Systems. According to Black et al. (2007), the similarities of the LMSs are more than their differences on the basic functions such as quiz/test options, forums, a scheduling tool, collaborative work space and grading mechanisms. However, they can be distinguished with the micro-detailed features such as the ability to record synchronous meetings or the ability to download forum postings to read offline (Black et al., 2007).

There are some definitions of the LMSs in the literature:

"An LMS is the infrastructure that delivers and manages instructional content, identifies and assesses individual and organizational learning or training goals, tracks the progress towards meeting those goals, and collects and presents data for supervising the learning process of an organization as a whole (Szabo & Flesher, 2002 as cited in Watson et al.,2007, p.28).

"An LMS delivers content but also handles course registration and administration, skills gap analysis, tracking and reporting (Gilhooly, 2001 as cited in Watson et al.,2007, p.28)".

Typically an LMS allows for learner registration, delivery of learning activities and assessment in an online environment. LMSs that are more comprehensive often include tools such as competency management, skill-gap analysis, succession planning, certifications and resource allocation (venues, rooms, textbooks, instructors, etc.). Also, Winter (2006) states that using LMSs bring many advantages such as that they requires the instructors' preparation for the course; the students can reach the information anytime and any place thanks to LMSs; and LMSs make easy to contact with faculty and instructors who may be difficult to reached for help.

When the place of LMSs in the market is investigated, it is seen that Moodle has more than half of the market compared to Blackboard and Sakai by taking into the number of known 'deployments' of the LMSs (Rosen, 2006 as cited in Winter, 2006, p.9) (Figure 1).

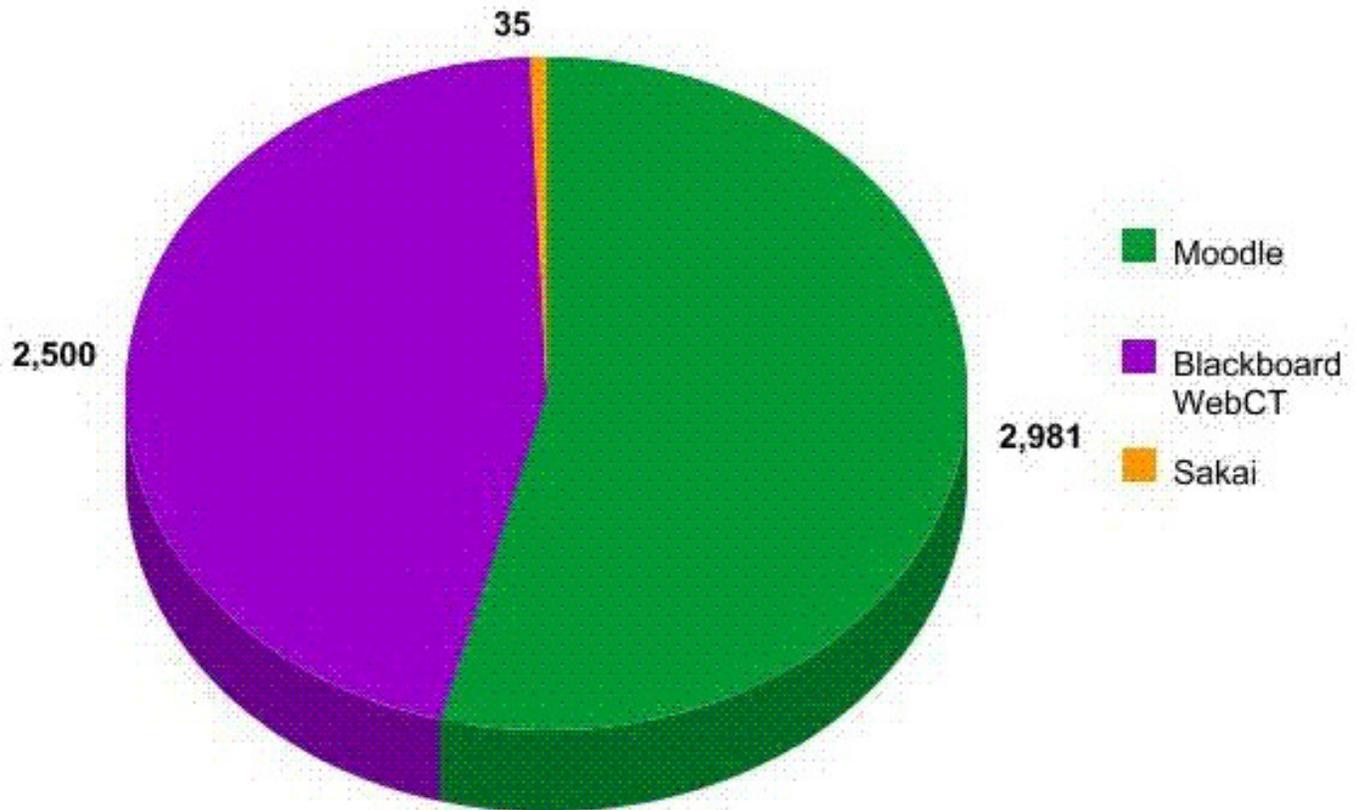


Figure 1: Market Penetration of LMSs

On the other hand, Falvo and Johnson (2007) acknowledge different results the uses of the LMSs in the higher education in USA. According to their study which investigates the use and popularity of LMSs in 100 institutions among 2000 institutions, most popular LMS at colleges and universities in the USA is Blackboard and the second one is WebCT, which merged with Blackboard. While 21 schools seem to not offer online courses, other uses different LMSs (Figure 2).

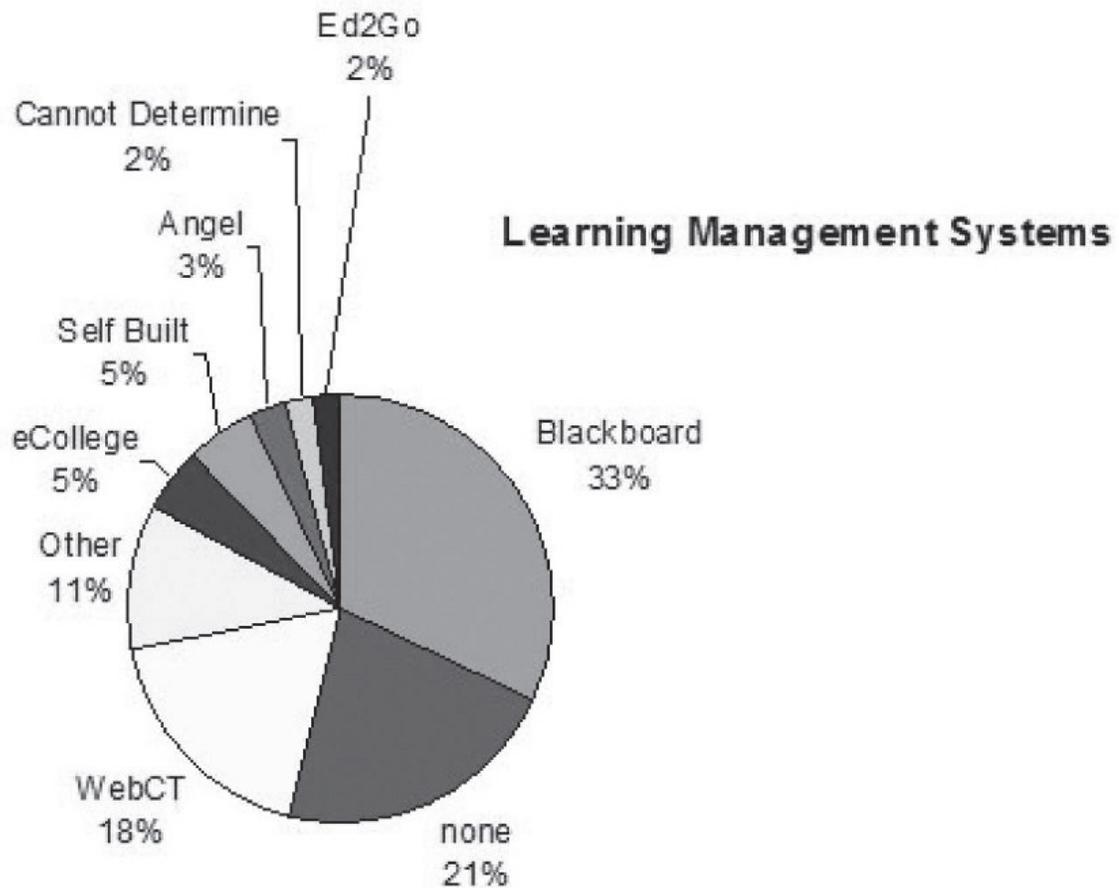


Figure 2: Learning Management Systems used in higher learning institutions in USA

Sakai

Sakai is an Online Collaboration and Learning Environment which was stated to be designed in January 2004 with a \$2.4 million grant from the Andrew Mellon Foundation (Adkins, [Online]). Then the Sakai Project was lunched by the University of Michigan and Indiana University, where both universities independently began open source efforts with the aim of enhancing the functionality of their existing CMSs (Severance and Hardin [Online]). MIT, Stanford, and the uPortal Consortium with the support of the Mellon and Hewlett Foundations launched the Sakai Project of which aim is to develop a set of open-source *Collaborative Learning Environment* software for the higher education community, such as learning management systems, assessment tools and a research support collaboration system (Adkins, [Online]; Severance and Hardin [Online])

Sakai LMS includes a set of software tools which help instructors, researchers and students in order to enable them to create websites; enhance teaching and learning; organize communication and collaborative work on campus and around the world; make announcements and share resources, such as electronic documents or links to other websites. In addition, there are online discussion board and a course worksite where the students can work and submit assignments electronically (Sakai [Online])

Moodle (Modular Object Oriented Dynamic Learning Environment)

Moodle is an LMS which is claimed to be developed based on social constructivist and social constructionist pedagogies by Martin Dougiamas (2003) as part of a research project. The collaborative discourse and the individual development of meaning through construction and sharing of texts and other social artifacts are supported to these pedagogies (Dougiamas, 2003 as cited in Winter, 2006).

Rice (2006) states that Moodle offers great flexibility for instructors in their instruction because instructor can add, move, and modify course material and grading tools easily in the Moodle environment. Also, Winter (2006) points out that providing feedback to students for assignments and tracking them are easy in the Moodle. For example, Moodle support both linear and nonlinear learning sequences using a content library; Discussions can be split from main discussion into new discussion and students may take posts of discussion forums via email. Also, three default course templates arranged by week, by topic, or a discussion-focused social format are provided by the system. In Addition, it enables instructors to create new course or content templates. These templates including a WYSIWYG content

editor with spell-checking also can be used to create discussion forums, links, course content, and resources, and these templates (EduTools, 2007)

Blackboard

Blackboard, which offers various web-based software products for online learning, was formed in 1997 and began working for IMS Global Learning Corporation as a consulting firm. Blackboard merged with Courseinfo, which was founded at Cornell University as a small course management software provider, in 1998. Then in 2005, it merged with WebCT and Blackboard's main competitor in the education market (Rice, 2006). "The aim is *to harness the power of information technology to modernise structured learning*" (Rice, 2006, p. 7).

According to Falvo and Johnson (2007) the Blackboard LMS is easy to use by both designers, course participants, and maybe for that reason it is used K-12 schools, in corporate training environments as well as higher education. Its architecture is instructor centered and hierarchical. For that reason, it is known as being somewhat rigid and inflexible and suitable for more teacher-centered instruction. Although it has social learning tools and some degree of modularization with its Building Blocks feature, the basic version of Blackboard does not have the Building Blocks modules and the available of it is much more expensive (Winter, 2006). When EduTools web site investigated it was seen that Blackboard has many main features of Moodle or Sakai LMSs. However, instructor is more responsible for the course creation and permission. One of the different features of the Blackboard is that it enables students to attach their notes any page and combine their notes with other course content. So, they can share notes with others and it prompts the interaction (EduTools, 2007).

Intact

Interact is an open source learning management system which is developed to facilitate online interaction and community building in an e-learning context. Like Moodle, according to Davis (2004), it is claimed to be based on constructivist and pedagogies (cited in Winter, 2006). Also, in LMS News (2003) web site, it is described as the ideal choice for collaboration software because it offers common tools like discussion forums, weblogs and chats, drop boxes, collective files, notebooks and the possibility to create interactive quizzes. However, it has some weaknesses in that for administering courses in terms of a calendar of events with registration, Interact is not a good choice (LMS News [online])

Pedagogy as the Main Issue of Instruction

Failed attempts to reform of the process of teaching through the introduction of technological innovations are reality discussed in the Instructional Technology field (Nicolaou et. al., 2005). As well, the debates between Kozma and Clark if methods or media affects the learning have made big impact on the field. Despite the failure cases and debates about technology, every new technology continues to be seen as a panacea for educational problems. Especially, the Internet has been widely used as the delivering vehicle for information, many traditional teaching and learning activities are increasingly relying on emerging technologies. As a result, nowadays, new technologies especially LMSs have been provided for teachers and students by many universities, colleges and K-12 schools (Lu & Chen, 2006) and technology is seen to be more important than pedagogy. However, the author advocates that the most important issue about the technology is to select most appropriate one for the instruction. In other words, the advantages of one LMS over a variety of LMSs such as Sakai, Blackboard, WebCT, Intact and Moodle do not much affect someone's instruction as much as the method used during the instruction. Hannafin et al. (1996) state the same fact by saying how technological capabilities are utilized is more critical than the capabilities themselves. Winter (2006) supports the same idea with the words "Whilst a determined facilitator would find a way to adapt the use of an LMS to suit his/her teaching style and pedagogy, the design could make the task easier or more difficult" (p.25). Goodyear (2005) and Laurillard (2002) state that one key to success appears to lie in the design of learning environments that make effective use of the communication capabilities of technologies that can connect learner in a meaningful way (as cited in Herrington et al.,2006). Alavi (2004) also points out that Distributed Learning Environments are waste resources and dissatisfy learners if course designer does not consider students' attributes and instructional strategies. According to the author, use of technology in courses does not guarantee the desired learning outcomes because the important issue is the design of course, not the capabilities of the media used during the instruction. For that reason, the author agrees with Nicolaou et. al.'s (2005) who say, we should rely on robust design which will ensure that the learning environments are organized and structured according to effective pedagogical principle. According to Strehle et al (2002) instructional goals and according to Leopold- Lussmann (2000) the needs as well as learning styles of users and instructors is important issues and should be taken into consideration while choosing online learning tools (as cited in Falvo and Johnson, 2007). Also, Moore (1994) points out the same issue in his "Transactional Theory", interaction is one of the most important ways to maintain quality of instruction in Distance Education programs as well as traditional ones (as cited in McIsaac & Gunawardena, 2003). The author thinks parallel to McIsaac and Gunawardena (2003) who advocate that interaction between learner-learner, learner-instructor and learner-content is so necessary for the teaching and learning process and media has a critical role to provide the two way exchange of information.

In the LMSs technology, forums have a promise to provide learner-learner and learner-instructor interaction. However, the properties of the forums in different LMSs are changing, also. For example, while forum postings can be forwarded to participants in Moodle and Interact unfortunately Sakai and Blackboard lack this feature (Winter, 2006). So, if posting forum messages to learner is important in the

course according to instructor, s/he should use Moodle or Interact LMSs. On the other hand, if s/he thinks that it is not critical, s/he can use other LMSs that have other capabilities making the same job to forums such as e-mail (s/he can post important forum messages with the help of e-mail to learners).

Hill et al. (2003) state that learner-instructor interaction enables feedback as well as opportunities to motivate and support the learner. For example, Moodle and Sakai do not have the whiteboard feature of Blackboard, which enables instructor to get all students to come online in order to explain specific points. However, they have a real time chat feature that functions as whiteboard and enables instructor to contact students synchronously (EduTools, 2007). Actually, these two different capabilities do the same functions. For that reason, instructor can prefer any of these LMSs if s/he needs these features in her/his instruction.

According to Moore (1994) the exchange of information or ideas that occurs between students refers to learner-learner interaction. In fact, the decision on whether the course designed in a structured and non-structured manner effects the interaction between learners (cited in McIsaac & Gunawardena, 2003). However, different LMSs that present different tools to provide the learner-learner interaction and one of them may much suit the instruction over the others. For example, both Moodle and Sakai enable learners to form groups, however, Moodle is more flexible to provide this because its workshop module enables students to review other students' work. In other words, Moodle supports the peer review. On the other hand, Sakai supports distinct 'project' sites, separate from the main course site and for that reason students cannot review other students work (EduTools, 2007). If the feature of Moodle which enables learners to assess each others' projects and homework is important for the instruction, instructor should choose it for her/his instruction.

Another important issue in teaching/learning process is to present information in different ways. Cognitive Flexibility Theory proposes the application of prior knowledge to go beyond the information given in addition to multiple presentation of information (Shapiro, 2003). Instructors enable to use different software with regard to the idea that if the learning environment is linked with other types of software, which enables multiple representation of information, such as image repositories, voice facilities or video communication, learning enhances. Such links are supported in the Moodle environment. Building Blocks program which has been introduced in Blackboard also provides same flexibility of the Moodle system (Winter, 2006). On the other hand, Sakai does not support video communication but just audio communication (EduTools, 2007).

LMS Technology as a Supporter of Pedagogy for Effective Learning

Although pedagogy is the main issue while designing courses, technology is also important in terms of that flexible environments can enable instructor to design their courses. In other words, technology should support pedagogy in order to make instruction effective. Especially, as Bates (1994) points Distance Education systems depend on technology for administration, development, production, delivery of teaching materials and increasingly student-teacher interaction.

For example, one of the LMSs, Moodle, was designed to support a social constructionist epistemology of teaching and learning. Some of the design decisions of Moodle have been strongly influenced for that reason and it provides pedagogical aspects which do not provided by other e-learning platforms. One of the most important capabilities of LMSs is their allowing collaboration between learners. However, Moodle has advantage over other LMSs in that it allows groups to see each other works. On the other hand, Sakai does not support that but it allows files exchange within the group members, not between the groups. Also, each participant can be a teacher as well as a learner in Moodle environment. The task as a 'teacher' can change from being the 'source of knowledge' to being an influencer. In addition, Moodle is useful in an outcomes oriented classroom because of its flexibility. Among other features, it includes forums, resource management tools and quizzes (Winter, 2006). Duffy and Cunningham (1996) state that experiences are important in constructivism and learning occurs through experience, Moodle environments seem to provide this experience with its flexibility. For example, Moodle enables learners to use scales to rate or grade forums, assignments, quizzes, lessons, journals, and workshops. Anyone who is grading or evaluating a student's work can use these scales. The user can apply a scale to so many types of activities in order to make the courses more interactive and engaging. Also, teachers can collaborate in special forums (bulletin boards) reserved just for them in Moodle environment while they can collaborate with their colleagues via e-mail in Sakai environment (Rice, 2006). Moodle can enable user to keep detailed logs of all activities that users perform on the site. It is useful to determine who has been active in your site, what they did, and when they did it (Rice, 2006). Although the Sakai have the same features such as forum and different software usage, it limits instructor while designing course. For example, the forum in Sakai does not support video communication or requires instructors to create a separate profile for each course. Also, forum enables several instructors collaborate on a course. The link for the Teacher forum appears in the Administration block, so it is not visible to students because that block does not display for students.

Other LMSs, Blackboard, for example, has some certain features, which do not exist in Moodle environment such as a drop box facility supporting users while working in two locations. This feature may be important in terms of content-learner interaction. On the other hand, Moodle's having been more user-friendly, customizable and engaging as well as supporting learning as a social event, and learner centered approaches can be considered superior to Blackboard. Moodle architecture is modular in nature (Winter, 2006). All these features should be taken into consideration while choosing a LMS. For example, if the instructor wants give students more control, s/he should choose Moodle. If s/he wants students to have a limited control because s/he wants more teacher-centered instruction, s/he should choose an LMS such as Sakai, Blackboard and so on.

As realized from the LMSs examples, technologies can have different capabilities. These different capabilities should be considered while choosing a technology which is used in the instruction. For that reason, firstly teachers should clearly define their needs and LMS vendors' abilities to satisfy them. They should do a through evaluation of the different systems and chose the appropriate one to their instruction (The Company National Institute of corrections, 2006).

Usability Issues in Different LMSs

Learner's ability to use communication medium facilitating course refers to usability (Hill et. all, 2003) and usability is closely connected with the learner-content interaction. In other words, the more easy to use tools enhance the more learner-content interaction. For that reason, tools' being easy to use are a "must" not just a "nice-to-have" (Moodie and Knuz, 2003). In LMS technology, Winter (2006) states that %80 of the students found that Moodle is more easy to use than Intact and Blackboard in his study. Like students, instructors found it easy to find course material, which was hyper linked, and downloading and printing resources was simple (Winter, 2006). Also, instructors can edit and modify materials to the Moodle system more easily. Also, learning sequences can be created both linear and nonlinear while in Sakai and Blackboard, only linear learning sequences can be created. Another advantage of Moodle over the other LMSs is that it is enough for instructors to have a single profile page for all courses. On the other hand, instructor should have a separate home page for each course and this feature of Moodle enables instructor spend less time to design course as well as easily ordinate the LMS environment. From the learner perspective, Moodle's having materials organized in modules and topics makes their use much easy compared to chronologic organization in Blackboard. However, the digital drop-box feature of Blackboard which enables learners to access materials in different locations are absent in Moodle system (Winter, 2006). So, if the instructor is newly used an LMS, s/he can choose Moodle for its usability feature. On the other hand, Blackboard presents a hierarchical instruction opportunity that the instructors can be directed and it is easier to handle while designing a course. All these usability issues are clues to choose the most appropriate LMS.

Conclusion

That the most important factors that affect the online learning and teaching activities are pedagogy and use of technology. On other hand, flexibility of the technology enables the teachers to design their courses. Technology that is more restricted may prevent them to make changes in their course and access their students immediately or give feedback in an effective way. For that reason the technology which best appropriate to instruction should be used while designing courses. As stated by Winter, (2006) the question of which software to use for a given educational situation is complex but factors such as type of program to be offered, the preferred pedagogy, the learner profile of the target audience, online accessibility and cost should be considered while choosing the technology. Instructor can choose any LMS while designing a course. It can be Moodle or Sakai or another LMS. The important issue is to decide how their instruction will be and whether this technology supports it or not. For example, assume for instructor who designs a distance course thinks that the groups' seeing each others' works is important and if s/he can use an environment which support it, his /her instruction would be more effective. To do this, s/he can choose both Moodle and Sakai. The only difference is that if s/he chooses Moodle, groups can see each others' works in the environment without any extra effort; if s/he chooses Sakai the groups can share group works with other group members via e-mail. In other words, s/he can provide collaboration among groups with both LMS but in Moodle, it is easier.

Moreover, there is another important issue, usability of tools. The author agree with in that saying "Learners who do not have the basic skills required to use the interface of a communication medium spend inordinate amounts of time learning to interact with the technology in order to be able to communicate with others or learn the lesson" (McIsaac and Gunawardena, 2003, pp.362). For that reason, to choose tools, which are easier to use enables students, focus on learning the content instead of focusing on tool use. Winter (2006) states that in his study instructors and learners found Moodle easier to use than Intact and Blackboard. Also, Ganjalizadeh (2006) points out that comments from first time users among faculty show that navigating the site is difficult. However, Blackboard user states that they found Sakai interface much familiar and they did not have difficulty for that reason.

Briefly, although LMS is an important tool that supports high-quality educational experience, to see it as any sort of panacea would mistake us (Flowers, 2001, cited in Falvo and Johnson, 2007). According to the author the most important challenge as Çağıltay's asked (2001) is that does the way reaching success stem from technology or pedagogy (p.1)? This question should be considered very seriously because most institutions assume that when they provide technology, their distance education will be effective. However, it may be a reason for failing in distance education.

References

- Sakai. About Sakai.
Retrieved 8 July 2007 from <http://www.sakaiproject.org>
- Adkins, S. S. (2005). Wake-Up Call: Open Source LMS.
Retrieved 8 July 2007 from <http://www.learningcircuits.org/2005/oct2005/adkins.htm>
- Alavi, M. (2004) Distributed Learning Environments. *Computer*, 37 (1), 121-122.

- Bates, A. W. (1994). Distance education, educational technology in. *The international encyclopedia of education* (2nd ed.) Elsevier Science.
- Black, E., Beck, W. D., Dawson K., Jinks, S. & DiPietro, M. (2007). The other side of the LMS: Considering implementation and use in the adoption of an LMS in online and blended learning environments, *TechTrends*, 51 (2), 35-39.
- Cagiltay, K. (2001). Uzaktan Egitim: Basariya Giden Yol Teknolojide mi Yoksa Pedagojide mi? *Elektrik Muhendisleri Odasi Dergisi*, 409-412.
- Duffy T. M. & Cunningham (1996). Constructivism: implications for the Design and delivery of instruction. Ch 7 in David H. Jonassen (Ed.). *Handbook of Research for Educational Communications and Technology*. NewYork: Macmillan.
- EduTools. (2007). CMS. *CMS Home*. Retrieved May 15, 2006 from <http://www.edutools.info/static.jsp?pj=8&page=HOME>
- Falvo, D. A. & Johnson, B. F. (2007). The Use of Learning Management Systems in the United States, *TechTrends*, 51(2), 40-45.
- Ganjalizadeh, S.(2006). Overview of Open Source Learning Management Systems. Retrieved 8 July 2007 from <http://www.educause.edu/ir/library/pdf/DEC0602.pdf>
- Gunawardena, C. N. (2003). Distance Education. Ch 14 in David H. Jonassen (Ed.). *Handbook of Research for Educational Communications and Technology*. NewYork: Macmillan. pp. 355-395.
- Hannafin, M. J., Hannafin, K. M., Hooper, S. R., Rieber, L. P. & Kini, A. S. (1996). Research on and research with emerging technologies. Ch 12 in David H. Jonassen (Ed.). *Handbook of Research for Educational Communications and Technology*. NewYork: Macmillan.pp. 378 -402.
- Herrington, J., Reeves, T. & Oliver, R. (2006). Authentic Tasks Online: A synergy among learner, task, and technology. *Distance Education*, 27 (2), 233-247.
- Hill, J. R., Wiley, D., Nelson, L. M. & Han, S. (2003). Exploring research on internet-based learning: from infrastructure to interactions in David H. Jonassen (Ed.). *Handbook of Research for Educational Communications and Technology*. NewYork: Macmillan. pp.433-460.
- Moodie, P & Knuz, P. (2003). Recipe for an Intelligent Learning Management System (iLMS). Retrieved 8 July 2007 from http://www.cs.usyd.edu.au/~aied/vol4/vol4_moodie_kunz.pdf
- Learning Management System Implemented at Corrections Institute. *T+D*, Sep2006, 60 (9), 86-87.
- LMS News (n.d.) Interact 2.0 Review
Retrieved 18 June 2007 from <http://www.lmsnews.com/modules/content/index.php?id=18>
- Lu, E.J.-L. & Chen, Y.-H. (2006). Design of a delegable SCORM conformant learning management system. *Journal of Computer Assisted Learning*, 22 (6), 423-436
- Nicolaou, C.T., Nicolaidou, I. A. & Constantinou, C.P. (2005). The e-Learning Movement as a Process of Quality Improvement in Higher Education. *Educational research and evaluation*. 11 (6), 605- .
- Rice, W. H. (2006). Moodle E-Learning Course Development: A complete guide to successful learning using Moodle. Packt Publishing.
- Severance & Hardin (2006). Strategic Directions for Sakai and Data Interoperability. Retrieved 8 July 2007 from http://www-personal.umich.edu/~csev/papers/2006/2006_07_Roadmap_Interop.pdf
- Watson, W. R. & Watson, S. L. (2007). An Argument for Clarity: What are Learning Management Systems, What are They Not, and What Should They Become?, *TechTrends*, 51(2), 28-34
- Winter, M. (2006). Learning Management Systems for the Workplace [Electronic Version]. A Research Report. Core Education Ltd. PO Box 13678. Christchurch.
Retrieved 18 June 2007 from http://www.tanz.ac.nz/pdf/LMS_Final.pdf