Journal of Theoretical and Applied Information Technology
31st July 2018. Vol.96. No 14

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

INTERACTION AND LEARNING MODEL IN E-LEARNING USING LEARNING MANAGEMENT SYSTEM

[1]SANTY, [2]S. KURNIALI, [3]INDRAJANI
[1,2,3]Bina Nusantara University, Department of Information Systems, School of Information Systems, Jakarta, Indonesia
Email : [1]santy@binus.edu, [2]sartikakurniali@binus.ac.id, [3]indrajani@binus.ac.id

ABSTRACT

It is important for learners to be able interact and learn, even in an e-learning environment. The study focus on developing a model of interactions with the components within the learning environment along with the Learning Management System features that can be used to support the interactions. In this paper we propose an Interaction and Learning Model in E-learning using Learning Management System (LMS). In this approach the LMS acts as a hub that connects every actor and element in the e-learning and acts as a platform where all the e-learning activities will take place. The model emphasizes the relation between the learner's interactions and learning to the type of e-learning and features practiced inside a LMS.

Keywords: *E-Learning; Interaction; LMS; Interaction Model; Features In LMS; Learning Model*

1. INTRODUCTION

Interaction has long been a defining and critical component of the educational process and context. Yet it is surprisingly difficult to find in the education literature, an elaborated model of interaction along with the LMS features which support the interactions. Interaction (or its derivative term interactivity) serves a variety of functions in the educational transaction including e-learning. Interaction in formal education contexts is specifically designed to induce learning directed towards defined and shared learning objectives or outcomes [1].

Although the interaction will mimic the interaction in real world, it is possible the technology also enables interaction that might only can be done with the use of the LMS. The study focus on developing a model of interactions with the components within the learning environment along with the Learning Management System features that can be used to support the interactions.

2. THEORETICAL BACKGROUND

For this research, we conduct extensive literature reviews of theories related to interactions in a learning environment setting, as well the theories on learning management system.

The learning management system (LMS) is the system responsible for integrating all learning services and managing teaching and learning activities. It provides a collection of tools and functions to support teaching and learning processes, usually including course management tools, online group discussion, homework collections and grading, and course evaluation [2].

The LMS can be used to facilitate e-learning. There are many terms that mean almost the same with e-learning, such as web based learning, computer-based training / learning, distance learning, computer aided instruction, and others.

According to [3], e-learning is all the teaching activities that use electronic media or information technology. While, according to [4] e-learning is learning that uses computer technology at a distance. According to [5] e-learning is the availability of information online for the purpose of education, training, or knowledge management.

The progress of e-learning usage is driven by the advantages and benefits for the user. According to [5] the benefits include:

1) *Cost of Learning* - E-learning can reduce the cost of teaching, because there are no expenses to spend on Teacher, Classroom, Transportation and other facilities like additional expenses of food purchase and classroom equipment.
2) *Flexibility of time* -With e-learning, both participants and Teachers have the flexibility of time. In comparison to the conventional teaching methods or face to face, both participants and faculty can participate in the

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

interaction while performing their important daily routines.

3) *Flexibility in Place* - With e-learning, to be in same place is not a necessity. Participants and teachers can access themselves anywhere, as long as they are computer connected into an e-learning server, both on the Internet or an intranet.
4) *Flexibility of Learning Speed* - The learning speed using e-learning can be adjusted to the speed of each participant
5) *Standardization of the learning* - E-learning can provide the standard of teaching so that all e-learning course material has the same quality each time it is accessed and does not depend on the mood of teachers.
6) *The effectiveness of teaching* - E-learning instruction is designed to make the participants to have a better understanding over the material delivered using simulation, cases, forms of the game, and apply animation technology.
7) *Velocity distribution* - E-learning can quickly reach those who are far away from where the organizer is.
8) *Availability on request* - The point is that e-learning materials can be accessed at any time whenever you need it as long as you still have access to such materials.
9) *Automation of administrative processes* - E-Learning that uses a Learning Management System (LMS) may function as a learning media for E-learning. LMS can be utilized to store participants data, instructional materials and on-going learning process.

There are two types of e-Learning delivery, asynchronous and synchronous learning. Asynchronous online courses give anytime/anywhere learning style to the students; while, in synchronous online courses, students have the freedom of place but have to login at a specific time [6]. Virtual classrooms enable instructors and students to interact online synchronously. The best advantages of synchronous online instruction are that faculty and students can talk to each other using text, audio, and video and express emotion using emoticons. The features available in the synchronous virtual classroom play an important role in maintaining interaction [6].

Interaction is at the heart of the online learning experience. [7] proposed a model of interaction where the learner is the center and has four potential realms of engagement: instructor, learners, content, and environment. In each of these realms, the learner can ignore or be deprived of engagement altogether, engage in transactional communication, or engage in fully interactive communication by moving outward from the center of the diagram. Fig. 1 below depicts the model of interaction developed by [7].

The Internet may be, as typically suggested, important in distance education for facilitating connections between groups of students, educational institutions, and external learning resources. However this is not the only reason for applying information and communication technologies in higher education in a remote area of a developing country, such as Indonesia. In addition, the Internet seems to be of great importance in symbolizing modernization and progress, thereby adding symbolic power to such education [8].

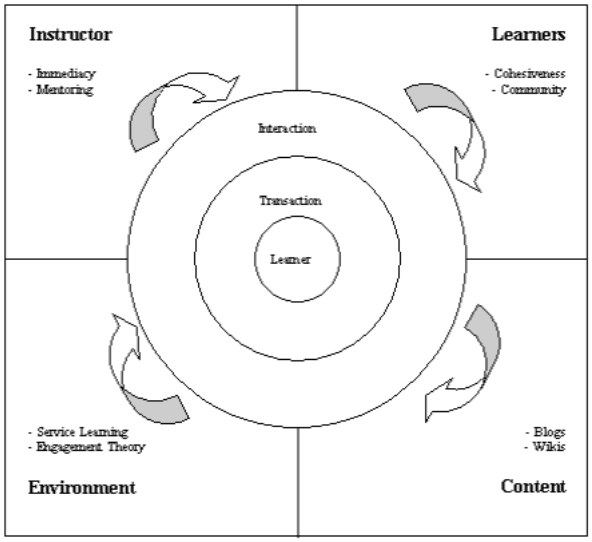

Figure 1. Proposed Model Of Interaction [7]

Students' ability to participate in distance higher education to a large extent is a result of the features of the places where they live, and it is well documented that the uneven distribution of new technology correlates with access possibilities to higher education [9]. However, also features of the technology in use will affect the accessibility. It may, for example, be easier for a student to access a web page than to participate in teleconferencing.

E-learning courses may be of three kinds [10] :

1) *Online distance-learning courses:* The majority of, if not all, instruction takes place online. There are norequirements for face-to-face meetings between students and instructor, either in the classroom or via

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

video during the course, called e-learning mode.

2) *Hybrid courses:* In these courses the instructor combines elements of online distance-learning courses and traditional courses. Online forums or Web-based activities may replace a portion of classroom sessions, which is known as blended learning mode.
3) *Traditional courses with technology elements:* These courses are traditional in that the instructor teaches all sessions in the classroom but with the occasional use of technology, such as Web-based activities, multimedia simulations, virtual labs, and/or online testing, which is known as e-enhancement mode

3. THE INTERACTION AND LEARNING MODEL

For this study, we use the [7][11]proposed model of interaction where learner is in the center and has four types of interaction which are learner – instructor , learner – learner, learner – content and learner – course interfaces.

We develop a model which include the research finding and implications for practice of each interactions which are the results from [11] research. In the model we also include the LMS features for each interaction, where the features are divided into two types of learning, Asynchronous Learning and Synchronous Learning

B. Learning Effectiveness: Interaction with Content

In the interactions between Learner and Content, learners are expected and challenged to do exploration the content available asynchronously or synchronously. These exploration can lead to a more complex and multiple developed perspective of the students.

In a asynchronous learning environment, learners are presented with online materials where they can do search and retrieval, look into available tutorials, games simulation provided, virtual labs and e-books [1]. Along with the rising development of community based knowledge, learners can also utilized features like blogs and wikis [7] to get additional knowledge for their course. A stable internet connection can still be a huge challenge for many learners in e-learning arrangement, therefore it is crucial to have backup files of live audio or video conferences [12] so that learners who had difficulties joining the live conference can still access the materials later on.

Along with the presentation files made available in the e-learning, additional materials such as online summary [13] and web links [6] would enhance the learner-content interactions in the e-learning arrangement. With further technology development in the field of semantic and knowledge, a feature of Q/A (Question and Answering) system can be provided in the LMS [14]. This Q/A system will enable students to look for answers of their questions in the LMS itself rather than finding it in the search engine which knowledge scope is not specifically related to the course which the learners are enrolled in. The most important point of the learner-content interactions in a asynchronous e-learning situation is that the content should be made accessible at any time and give learners the ability to review course content and a means for obtaining clarification about course content and/or assignments at a later date [6]

In a synchronous learning environment, learners are able to access the content in a specific time frame. This can be done with features in the LMS such as real-time presentation [15], desktop application sharing [9], and the ability to click on the web links from the chat room [6]. Synchronous learner-content interaction is highly related with the synchronous learner-instructor interaction where during the learner-instructor interaction, the instructor can share visuals and demonstrations along with the chat options which enhances learner-content interaction [6]

C. Learning Effectiveness: Interaction with Instructors

In the asynchronous learning environment, the learners interaction with instructors can be mediated by the features in the LMS which allows the instructors to give advises to learners [7], do an offline communications or personal dialogues through text and voice mail [6][7]. A discussion forum is another features required in a LMS designed for asynchronous learning. With this feature, the instructor is enabled to throw in discussion topics or assignments to the learners [6][13]. Should the instructor give assignments or discussion topic, the instructor should actively give feedbacks for the assignments or topics given [16]. An instructor can also use the Q/A system feature in the LMS to create questions and answers that would likely be inquired by the learners [14]. In the asynchronous learning environment, the instructor's role is more teaching the learners rather than explaining the materials to them.

While in the synchronous learning environment, the features of the LMS for learner-instructor interaction should allows students and instructors to communicate orally, exchange messages through

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

typing, uploading PowerPoint presentations, transmit videos, surf websites together and many more [15]. These many form of interactions can be mediated by features such as text chat [15], audio chat [1][6][15] , video chat [1, 9, 17] and shared white board presentation [15] where instructor can draw in his/her explanation in the e-board like when he/she is writing on a whiteboard. PowerPoint presentations used by the instructor are easily shared with the students through the e-board or content window and provide guidance for instructional flow [6] Text chat provides learner-learner and learner-instructor interactions for both social and content knowledge where Text chat provides immediate feedback for knowledge checks for learner-instructor interactions [6]. Instructor can also gather learners' opinion of certain topics using e-poll feature within the LMS [6]. To give more sense of a real classroom feel to the virtual classroom, feature like hand raising tool can be included in the LMS. This feature will give the chance for students to raise questions, answers or just comments during the synchronous learning activity [6]. Most of the features listed above are wrapped in the form of audio and video conference.

D. Learning Effectiveness: Interaction with Classmates

Another type of interactions performed by a learner is with his/her fellow classmates/learners. In the synchronous learning environment, this type of interaction is limited where they can interact each other by just text based computer mediated communications such as discussion forum [13], while in the synchronous learning environment, learner can have more interactions with his/her fellow learners through LMS features like breakout rooms for small group activities [15], class polling instruments [15], text chat [6] and shared desktop features [6]. Using the shared desktop features, allows learner to use their desktop to present and share their knowledge or present their work to the instructors or fellow learners [6]. When combined with text chat, fellow learners can enrich the interaction of learner-learner by commenting or give questions about the presentation given by one learner.

E. Learning Effectiveness: Interaction with Course Interfaces

The last type of interaction included in this study is the interaction between learner and course interfaces. Due to the live environment audio or video conferences in synchronous learning, it is necessary to provide support for learners by the university instructional technology staff at the beginning of each synchronous online session [15]

All features used to enhance the three different types of interaction above both in asynchronous or synchronous learning are enhancing the learner-interface interaction. Learner's computer experience, perceptions about the LMS technology being used and access of the technology all are linked with the learner-interface interactions [6]

The relationships between interactions and learning in online environments can be seen on figure 2 below.

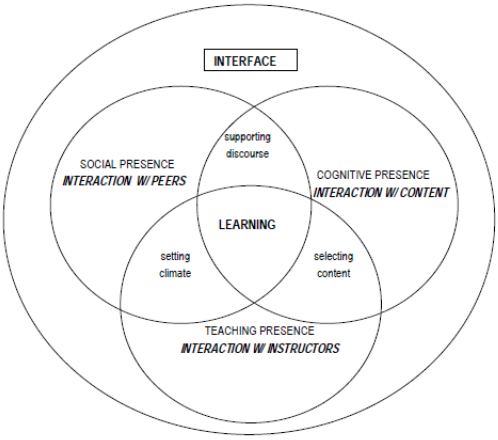

Figure 2. The Relationships between Interactions and Learning in Online Environments [11]

Below is table 1, the proposed interaction and learning model along with the LMS features in a asynchronous and synchronous learning environment.

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

Table 1 : Interaction And Learning Model Along With The LMS Features In An Asynchronous And Synchronous Learning Environment

Research Finding [11]	Implications for Practice [11]	Features for Asynchronous Learning	Features for Synchronous Learning
Learning Effectiveness: Interaction with Content			
Online discussion or learning may be more in favor of divergent thinking, experimentation, exploration of multiple perspectives, complex understanding and also reflection than F2F discussion.	Boost divergent thinking, experimentation, complex understanding, multiple perspectives, along with reflection in online discussion through open-ended questions, provocative, modeling, support and also praise for various points of view. Create grading rubrics for discussion participation that recompense anticipated cognitive behaviors. Create initial course activities to boost the progress of swift trust.	1. Search & Retrieval 2. Tutorials 3. Simulations Games 4. Virtual Labs 5. E-books 6. Blogs 7. Wikis 8. Backed up files of video and audio conference 9. Online summary 10. Web links 11. Q/A system 12. Assignments	1. Real-time presentation 2. Application sharing 3. Web links from the chat room 4. Shared visuals and demonstrations along with the chat options
Online discussion or learning may be less in favor of instructor directed examination, scientific thinking and also convergent thinking compared to F2F discussion.	Practice other course activities to support such as one-on-one tutorials, written assignments, small group collaboration & self-testing. Create grading rubrics for discussion participation which recompense anticipated cognitive behaviors.		
Learning Effectiveness: Interaction with Instructors			
Teaching presence — design & organization, facilitating discourse & direct instruction — is linked to student learning.	Highlight three essentials of teaching presence in faculty development & provide examples of how to improve in each area. Provide ongoing support for instructors in each of these areas.	1. Advising 2. Offline communication or personal dialogues via e-mail, text and voice mail 3. Discussion forum feedback from instructor 4. Q/A system	1. Text chat 2. Audio chat 3. Video chat 4. Shared white board presentations, 5. Student polls 6. Content window sharing 7. Hand-raising tool 8. Audio and video conferencing
The quantity & quality of instructor interactions with students is linked to student learning.	Provide frequent opportunities for both public and private interactions with students. Establish clear expectations for instructor-student interactions. Provide timely & supportive feedback. Include topic of instructor interaction in faculty development.		
Ongoing assessment of student performance linked to immediate feedback & individualized instruction supports learning.	Automate testing & feedback when possible. Provide frequent opportunities for testing & feedback. Develop general learning modules w/ opportunities for active learning, assessment & feedback that can be shared among courses &/or accessed by students for remediation or enrichment.		
Learning Effectiveness: Interaction with Classmates			
Learning occurs socially within communities of practice; there is greater variability in sense of community ratings among online courses than in F2F courses.	Design community-building activities. Model the usage of cohesive proximity behaviors in all interactions with students. Create initial course activities to boost the progress of swift trust.	1. Discussion forum 2. Class polling instruments	1. Breakout rooms for small group activities 2. Text chat 3. Shared desktop

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

	Address issues of community in faculty development.		feature
Verbal immediacy behaviors can lesson the psychological distance between communicators online; overall sense of social presence is linked to learning.	Create initial course activities to boost the progress of swift trust Model & encourage the use of verbal immediacy behaviors in interactions with students. Encourage students to share experiences & beliefs in online discussion. Introduce social presence & verbal immediacy in faculty development.		
Student learning is connected to the quantity and also quality of posts in online discussions along to the value instructors place on them.	Make participation in discussion a important portion of course grades. Develop grading rubrics for discussion participation. Require discussion participants to respond to their classmates postings &/or to respond to all responses to their own postings. Stress the unique nature & potential of online discussion in faculty development.		
Vicarious interaction in online course discussion may be an important source of learning from them.	Encourage & support vicarious interaction. Require discussion summaries that identify steps in the knowledge creation process. Use tracking mechanisms to reward reading as well as responding to messages.		
Learning Effectiveness: Interaction with Course Interfaces			
Interactions with course interfaces are a real factor in learning; difficult or negative interactions with interfaces can depress learning.	Work with major platforms to improve interfaces to support learning. Develop consistent interfaces for all courses in a program. Provide orientations to program interfaces that help students develop useful mental models of them. Provide 24/7 support for students and faculty. Make human tutors available.	All features used to enhance the three different types of interaction above enhance learner-interface interaction	Support from instructional technology staff All features used to enhance the three different types of interaction above enhance learner-interface interaction
Patterns of interaction in online discussion are as much dictated by the flagging of unread notes & display of individual messages as anything else.	Explore new interfaces. Make students responsible for sustaining discussion threads. Make students summarize discussion threads. Require students to incorporate materials from the discussions in their assignments.		
Better transfer of learning from narration & animation presented simultaneously, in conversational style, with irrelevant elements & on-screen text eliminated.	Present words in spoken form. Use both words and pictures simultaneously. Avoid extraneous video & audio. Do not add redundant on-screen text.		
Better transfer of learning when components of concepts are addressed first, when organization is signaled, & when the pace of presentation is learner-controlled.	Begin presentations with descriptions of components & organization. Return or signal both often. Allow learners to control the pace of presentations.		

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

4. CONCLUSION

The proposed model representing the mapping between previous researches findings, its implications for practice, and in the end how it can be implemented inside a LMS. These features also can facilitate both asynchronous and synchronous learning. However we have seen that not all of the models are a must to have to enable the learners to interact and learn. One next step is to elaborate which combination is required and which models might be optional and what kind e-learning kind they must be represented. Another next step is concerned to the comparison of the models, because each kind of e-learning has different levels of dependence with the LMS.

Limitation of these study is the research does not discuss on the impact of each interactions to the successfulness level of the learning experience itself.

REFERENCES

[1] T.Anderson, "Getting the Mix Right Again: An updated and theoretical rationale for interaction", International Review of Research in Open and Distance Learning, vol. 4(2), October 2003

[2] A.I. Albarrak, H.A, Aboalsamh and M. Abouzahra, "Evaluating Learning Management Systems for University Medical Education", 2010 International Conference on Education and Management Technology (ICEMT), 2010, pp. 672-677.

[3] Effendi, Zhuang. E-learning, Konsep dan Aplikasi, Andi, 2005.

[4] A. Henderson, The E-learning, Question and Answer , American Management Association, New York, 2003.

[5] E. Turban, et all, Electronic Commerce: A Managerial Perspective, Pearson Prentice Hall, New Jersey, 2004.

[6] F. Martin, M. Parker, and D. Deale, "Examining Interactivity in Synchronous Virtual Classrooms", International Review of Research in Open and Distance Learning, vol. 13(3), June 2012, pp.228-261.

[7] R. Woods an J. Baker, "Interaction and Immediacy in Online Learning", International Review of Research in Open and Distance Learning, vol. 5(2), August 2004

[8] S. Rye, "Negotiating the symbolic power of information and communication technologies (ICT): The spread of Internet-supported distance education", Information Technology for Development, vol. 15, 2009, pp. 17-31.

[9] J. van Dijk, The Deepening Divide: Inequality in the Information Society, London: Sage, 2005.

[10] V. Jaiswal, Current Status of E-Learning in Indian Higher Education: A Case Study of U.P http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2231910, (Accessed on 30 June 2013)

[11] K. Swan, "Relationships Between Interactions and Learning In Online Environments", The Sloan Consortium, 2004.

[12] J. Muhirwa, "Teaching and Learning Against all Odds: A Video-Based Study of Learner-to-Instructor Interaction in International Distance Education", International Review of Research in Open and Distance Learning, vol. 10(4), September 2009

[13] P. Murugaiah and S. Thang, "Development of Interactive and Reflective Learning among Malaysian Online Distant Learners: An ESL Instructor's Experience", International Review of Research in Open and Distance Learning, vol. 11(3), October 2010, pp. 21-41.

[14] D. Weng, J. Cuzzola, L. Brown and Dr. Kinshuk, "Instructor-Aided Asynchronous Question Answering System for Online Education and Distance Learning", International Review of Research in Open and Distance Learning, vol. 13(5), Nov 2012, pp.102-125.

[15] J. Lynn McBrien, R. Cheng and P. Jones, "Virtual Spaces: Employing a Synchronous Online Classroom to Facilitate Student Engagement in Online Learning", International Review of Research in Open and Distance Learning, Vol. 10(3), June 2009

[16] D. Annand, "Social Presence within the Community of Inquiry Framework", International Review of Research in Open and Distance Learning, vol. 12(5), May 2011, pp.40-56.