Efficiency and Effectiveness Index of Web-Based Instruction Blended Learning in the Basic Design Course of Undergraduate Students

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Abstract: The purpose of this study was to develop a web-based instruction blended learning design to demonstrate an undergraduate student's performance on a 80/80 basis to determine the effectiveness index of the web-based instruction blended learning on the development of undergraduate students to compare the academic achievement of students between their performance both before and after the test and finally to study the satisfaction and improvement of the students towards learning lessons on the web. The sample that was used for this study was one group of 30 undergraduate students majoring in New Media at the Faculty of Informatics, Mahasarakham University. The 30 students were selected using a purposive sampling technique from the students basic design semester 2 academic year 2010. The materials used in this study were web-based instruction blended learning achievement tests and satisfaction questionnaires. The statistics were used to analyze data including finding an average and standard deviation. The test (t-test dependent) results showed that lessons on the internet combined with process optimization represented 87.52% and effective results represented 85.23% which indicates that a combination of web-based lessons were effective (E1/E2) at an index academic achievement score of 0.71, 87.52/85.23. The students were statistically significant at the 0.01 level and the students were highly satisfied with learning from lessons on the web. This study uses a lesson of web-based instruction blended learning to measure efficiency and effectiveness. Students were highly satisfied after learning from this lesson and it can be said that this technique can be used to teach students to achieve their goals independently.

Key words: Efficiency, blended learning, information technology, basic design course, undergraduate student, Thailand

INTRODUCTION

In modern day society, the world of information technology is very important for communication. It involves storage, processing, presentation and information retrieval by electronic means. Advanced computer and telecommunication equipment is an important tool to communicate over the network and span the globe. The internet plays a major role because the internet is a computer network covering large sub-networks around the world that can be connected together using the same standard of communication. The internet is the main source that people use to gather information. In the modern world, every industry and career field of interest can use the internet to research topics immediately and communication can be made between people, enabling them to interact quickly and easily (Malithong, 2000). Therefore, this creates the link between economic activity, social, cultural, political and education as expressed. Who stated that the internet is a computer network that facilitates the creation of government organizations and the private sectors to be able to communicate quickly and efficiently throughout the world. There is huge potential for the internet as it has a wide range of uses and can most importantly be used to benefit education.

The benefit that derives from using the internet can take many forms. It can be used to study in greater detail an emerging role or to create a site for teaching and learning to focus on the needs of students and how to gain an appropriate education. Focusing on the needs of students and other website elements for teaching and learning is a different technique of developing skills than other types of educative media and technology because it is associated with communication in the daily lives of people in society. In the current issue of education and training, networking is attempting to improve the lack of knowledge, understanding and support and develop a student's ability. Connection to the internet may experience problems at times if it is not covered

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thoroughly and this reason may cause sites that are not yet produced to fail to meet the requirements. The study of current and future websites would be valuable if they were implemented exactly as intended. Therefore, the use of the internet for teaching and learning principles and theories should fully consider engine components, technology and more.

Teaching and learning through web-based instruction is a learning application. A multi-dimensional media program that utilizes the features of the internet by bringing existing resources on the world wide web to design a website to support teaching and to foster learning in various forms of effective links and networks to learn and conduct necessary research. It can be used anywhere at any time by teachers and students to interact through computer networks. The use of different technology can be useful and can stimulate students to learn and solve problems independently (Hopisan, 2001). This is consistent with education, religion, art and national culture 2002-2016 on guidelines for action 10: Development of technology for education and national development, said; current technology for education, especially information technology is increasingly important because education is not limited to the classroom or in a school but the life-long learning of everyone having an opportunity to learn anywhere and at anytime.

Learning and teaching using web-based instruction to manage higher education is a form of education that promotes learning among students using information technology to research information by themselves and respond to the concept of teaching that focuses on students. Students can learn by using a variety of methods which can occur at anytime and anywhere giving the students opportunity and equality of learning. Students can exchange their learning and send information to each other quickly, through social learning via the web. The student must be a thinker and decide on the content of learning ranking their learning and control the path of their learning through presentations and Interaction between students and instructors. In order for students to grasp the concept and content there must be a good learning environment. A good learning environment creates good learning and exchange between learners (Bonk and Graham, 2006).

Although, teaching and learning through the web is popular and fast, it still encounters problems with the design of teaching and learning on the web. This is because teaching and learning through the web is not appropriate to the learning style and the cognitive style of all form of learners (Bonk and Graham, 2006) and teaching on the web is not appropriate in all situations and is not appropriate for all students. The use of the web may be

useful for some students but all students must not be forced to learn on the web because the instruction on the web is not an effective teaching and learning for everyone (Palloff and Pratt, 2001).

Trouble-shooting the limitations of teaching through the web as mentioned above can be done by introducing forms of teaching and learning combines learning using web-based instruction and learning in the classroom which is known as the traditional approach, brings together the strengths of the classroom combined with the advantages of learning on the web. This form of teaching and learning is a new option for education at all levels, especially higher education (Jonassen and Hung, 2008). In this study, the researcher studied teaching and learning combined in terms of implementation activities, teaching, traditional approach and learning activities and teaching on the live web through live e-learning and learning on the self web through self-paced learning together with the integration of teaching techniques.

Using information on the web, a communication network and knowledge sharing system (Bonk and Graham, 2006) reviewed the content and presentation of the progress of activities in the classroom. A learning environment that encourages the exchange of a student's learning together in a context appropriate for each situation of teaching and learning activity will result in a student's ability to link their thinking process to solve a problem they are faced with. This entails using various methods to train students to think creatively to learn new things and to get new knowledge as knowledge is considered as experience and the application of such knowledge used in a creative way can successfully solve a problem.

The research's purposes:
- To develop web-based instruction blended learning using undergraduate students with an 80/80 performance efficiency criterion
- To determine the effectiveness index and gradual development of undergraduate students using the web
- To compare the academic achievement of students during before and after they have been taught
- To investigate the satisfaction of the students having learned using lessons on the web

MATERIALS AND METHODS

The sample used in this study:
- Professional teaching on the web, 5 members to check the quality paying close attention to the appropriateness of the content and optimization of the educational design on the web and the appropriateness of the learning management system

- Measurement and evaluation checked by 3 members to check the quality of the equipment used in the study and the quality of teaching materials on the web. To also conduct learning achievement and satisfaction test of the students
- The sample for the trial includes the undergraduate School of New Media, Faculty of Informatics. Mahasarakham University semester 2 academic year 2553 to test the quality of the web-based lessons. The try-out involved three tests; 3 students for one-to-one testing; 10 students for small group testing; 30 students for a field-trial with bachelor of industrial design students from the Faculty of Architecture at Khonkaen University. This was to determine the efficiency of web-based lessons
- The experimental subjects were 30 specifically obtained undergraduates from the School of New Media, Faculty of Information Technology. Mahasarakham University, enrolled in the course of basic design, 2nd semester of academic year 2553
- The subjects completed the study on the lesson content from the web and did normal activities in the classroom on the web. The ratio of teaching was 50:50 including instruction in the classroom and 50% were students being taught on the web for duration of 7 weeks

Variables studied: Variables are the web-based instruction blended learning. The dependent variable was academic achievement and the satisfaction of the students. The content of the study is content with the principles, concepts and theories that can be applied to creative design work in this experiment. The basic design course code is 1205002.

RESULTS AND DISCUSSION

Part 1: Trial lessons were given on the web and the performance of the students gradually showed improvement. The 1st experiment used one-to-one testing with 3 students to test the basic quality of the design lessons. The researcher observed and interviewed with the idea that the data gathered is revised. The results of this trial showed that the researchers needed to adjust the design lessons as the following issues were found. The character of the content needed adjusting as some images were too small and were not consistent with the content. In view of the content, some units were too small and should have included a video for teaching and learning. More natural color should be added to reinforce the learning on the web. The language in the order in each

activity should be made clear. The 2nd experiment used the technique of small group testing of 10 students used to test the readiness of the learning management system that meets the quality objectives or not. The tests were conducted by the researcher observing the subjects and interviews were given to find out the defects of that lesson. The student registration system experienced some delay which needs improvement. The management system delivered via the LMS model showed that the file size is too small. The file size should be fixed by adding more.

The due date should clearly specify the information required and the download file size should be paid close attention. The name of the file should be an ID which refers to the job and can easily be identified to avoid the evaluation becoming confused by duplicates. There should also be a file to send samples and specifications. This should increase interaction in the lesson. This should be done in any way with short thought-provoking questions. Experiment 3 is a Pilot field trial experiment of 30 students, conducted to determine the efficiency and proposed development of the web-based instruction on the web. The performance criteria (E1/E2) was at 80/80 and the results from experiment 3 were that E1/E2 outperformed the criteria with a result of 86.00/83.80.

Part 2: Experimental results with real samples using a combination on the web-based instruction blended learning. The Efficiency of the process (E1) was 87.52 and the performance result (E2) was 85.23. Lessons taken on the web showed efficiency (E1/E2) of 87.52/85.23. This was higher than the given criterion of 80/80 (Table 1).

Part 3: Study the effectiveness of student learning in the sample. The effectiveness index on the web-based Instruction blended learning, it can be shown with the value at 0.71, representing 71%. This indicates that with the experience of tackling a combination of lessons on the web, the student sample had gained more knowledge (Table 2).

Part 4: Comparison of student achievement sample. The mean scores achieved by the samples before and after the experiment being 14.30, 25.56, respectively with standard deviations of 1.19, 1.40, respectively. This indicates that the sample mean scores after the lessons have risen and shown improvement in the subjects (Table 3).

Table 1: The performance on the web-based instruction blended learning from experimental combination

Academic performance	Score	N	$\bar{x}$	SD	Percentage
Process effectiveness (E1)	170	30	148.80	0.51	87.52
Performance effectiveness (E2)	30	30	25.57	1.40	85.23

Table 2: The of effectiveness index in the sample

		Score		Percentage		
N	Score	Pre	Post	Pre	Post	E.I.
30	900	429	767	47.60	85.23	0.71

Table 3: The mean and standard deviation of achievement scores of students

	Pre		Post	
N	$\bar{x}$	SD	$\bar{x}$	SD
30	14.30	1.19	25.56	1.40

CONCLUSION

Lessons on the internet combined with process optimization represented 87.52% and effective results represented 85.23% which shows that a combination of lessons on the internet are effective (E1/E2) and shows an academic achievement index score of 0.71, 87.52/85.23. Overall, it can be said that after the test the students have statistically shown a significant improvement in their level. Students were also highly satisfied with lessons on the web. This research has shown that lessons taken on the web produce results of both efficiency and effectiveness. Students were extremely satisfied that after learning from this web lesson technique that they have gained a higher knowledge of the subject. It can be said that this method could therefore, successfully be used to teach students to achieve their goals in any given subject.

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REFERENCES

Bonk, C.J. and C.R. Graham, 2006. The Handbook of Blended Learning: Global Perspectives Local Designs. Pfeiffer Publishing, San Francisco CA., USA. ISBN-13: 9780787977580, pp: 585.

Hopisan, S., 2001. Innovation and application of technologies for education in the new millennium. Case Teach. Learn. Sripatum Rev. Hum. Social Sci., 1: 93-102.

Jonassen, D.H. and W. Hung, 2008. All problems are not equal: Implications for problem-based learning. Interdiscip. J. Prob. Based Learn., 2: 6-28.

Malithong, K., 2000. Educational Technology and Innovation. 2nd Edn., Chulalongkorn University, Bangkok, Thailand..

Palloff, R.M. and K. Pratt, 2001. Lessons from the Cyberspace Classroom: The Realities of Online Teaching. 2nd Edn., John Wiley and Sons, San Francisco, CA., USA., ISBN-13: 9780787955199, pp: 204.