

The Effects of Using Computer Multimedia for Mobile Device Based on BBL Concept

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— *Review of* —
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ABSTRACT

This study aimed to development of computer multimedia for mobile device based on BBL concept and studied about learning achievement, learning satisfaction and learning behavior. The sample was 95 students of 3rd and 4th year educational technology and innovation program, Nakhonratchasima Rajabhat University, Thailand. Research design is Randomized Controlled Trial by Cross over design. Research instruments consisted of computer multimedia for mobile device based on BBL, scenario, test, and satisfaction evaluation form. The research project was implemented during July, 2012 to August, 2014. Data were analyzed by using descriptive and t-test. Statistical significance is set at $p < .05$.

Research results are:

1. The computer multimedia for mobile device based on BBL has a good quality and the efficiency of E1/E2 is 81.17/80.56.
2. The students who used computer multimedia for mobile device based on BBL has learning achievement (mean=9.57, SD=1.40) higher than the students who used traditional (mean=8.01, SD=2.63) by statistic significant at the level .05.
3. The students who used computer multimedia for mobile device based on BBL has learning satisfaction (mean =6.12SD=0.94) higher than the students who used traditional (mean=4.85, SD=1.12) by statistic significant at the level .05.

The research results reflect that the students who used computer multimedia for mobile device based on BBL have a better learning achievement and more learning satisfaction than others in the learning process. Moreover, they have a good learning behavior such as interesting, concentration, participation, happiness and fun.

Keywords: Brain based learning, Computer multimedia, e-Learning, learning achievement, learning satisfaction, mobile device

1. Background

Nakhon Ratchasima Rajabhat University strategic plan 2010 – 2013 had the student centered policy for research and innovation promoting in order to encourage students' self-directed learning through learning process (Nakhonratchasima Rajabhat University, 2010). From my experiences of teaching Computer Network System for Education course in undergraduate level, I found that almost student had learning problem in reaching major goal of the course. They had inadequate knowledge and skill of network design and selected processes. Thus, it was challenged in developing more efficient learning materials.

Teaching was the art of changing brain schema and behavior. The traditional teaching methods such as lecture and whole-group instruction had been replaced by more brain

friendly techniques as our understanding of the brain increases (Jensen, 2008). Educators needed to have knowledge and understanding on important brain processes in order to be more efficient in improving students' learning. Brain based learning researches demonstrated that teachers had full impacts on their students. Educators should connect to students in two separated levels: academics and emotion. These connections had neurological foundations in building new neural connections, strengthening existing neural connections, and creating neural networks, referred to as neural superhighways (Connell, 2005).

Modern discoveries in neuroscience and cognitive psychology had constructed new forms of thinking about the brain, the human neurological structure, and the perceptions and emotions that contribute to learning (Southwest Educational Development Laboratory, 2007). Brain based instruction provided one approach for helping educate students that were most compatible with how the brain learned. Motivation and exploration were two strong forces that influence learning and determine students' interests in the learning process. Exploration was the search for constant innovative strategies and techniques in the teaching field, which was included in the integration of schools transformation into concrete learning organizations, while the use of BBL would help to increase awareness about how the brain learned from its environment (Sousa, 2003).

Brain based learning or brain compatible learning theory focused on concepts that create an optimal learning environment to maximize attainment and retention of information. The successful application was depended upon everyone involving in learning process. Online course developers, educators and student had to understand the brain structure and focus on learners' needs and styles to create brain based learning environments, materials and instruction in a fun, meaningful, personally enriching way (Lucas, 2004).

Brain based learning can improve student to self-development, active learning, searching skill, self-construction, and update knowledge. Student's achievement has improved to increase and student's behavior change to the better, for example emotion, good action, creative thinking, happy learning, appreciate other idea. And BBL can change teacher to approve teaching plan, learning objective, class participation, thinking environment, and practice (Maneepong, et al., 2007; Nakhonratchasima Rajabhat University, 2008; Pongkitwitoon, 2011).

Multimedia was an excellent tool for Learning. It could enhance instructor's ability in bringing real world to learners by using multi-sensory approach and using multiple types of media simultaneously with integrated manner. Media might include sound, graphics, video, text, animation, or any other forms of information representation. Multimedia could help motivating and giving students' additional connections to their personal knowledge structures. Multimedia also helped present learning in a multimodal manner, thus allowing students to build their connections, or neural networks, in responding to the materials being presented. Contemporary multimedia platforms allowed a greater degree of learner control and more freedom for learner to undertake self-directed exploration of the material. Such self-directed learning was likely to be more meaningful and more connected to existing knowledge structures within learner's brain. Therefore, educators should perceive the advantages of learning programs that included multimedia presentations (Forrester & Jantzie, n.d.).

Mobile devices present the opportunity to enhance our fast-growing and globally connected society, improving user-experience through novel approaches for information dissemination through mobile communication. The research community is developing new technologies, services, and applications to enable ubiquitous environments based on mobile technology. Mobile devices have fulfilled the true aim of Internet by offering full connectivity anytime anywhere. The trend of going wireless goes beyond the walls of homes, university buildings, or hotels and reaches the open spaces of nature or the mobile spaces of trains and buses. The freedom of movements is used to speak everywhere without the need to log in a local wireless network, and to extend it to other Internet services such as Web surfing, email checking, reading news, listen to online radios, or even watching video streaming and television. (Joel, et al., 2010)

This study aims to develop a computer multimedia for mobile device based on BBL concept of Computer Network System for Education course in undergraduate level, Nakhon Ratchasima Rajabhat University and study about student achievement, satisfaction and behavior.

2. Objectives

The objectives of this study were:

1. To development of computer multimedia for mobile device based on BBL concept
2. To compare mean of learning achievement between students learning by computer multimedia for mobile device based on BBL and students learning by traditional.
3. To compare learning satisfaction between students learning by computer multimedia for mobile device based on BBL and students learning by traditional.
4. To study behavior of students learning by computer multimedia for mobile device based on BBL.

3. Methodology

Research design was Randomized Controlled Trial (RCT) by Cross over design. The research project implement during July, 2012 to August, 2014. The sample was 95 students' 3rd and 4th year educational technology and innovation program, Nakhonratchasima Rajabhat University. They were random assigned to 2 groups. The 1st group was started learning with traditional learning strategies, then switched to computer multimedia for mobile device based on BBL (n=49), while the 2nd group performed vise versa (n=46).

Data were collected by using scenario, test and user satisfaction evaluation form. The satisfaction instrument comprised of 33 items in 11 dimensions such as information relevancy, information accuracy, information comprehensibility, information comprehensiveness, ease of use, entry guidance, structure, hyperlink connotation, speed, layout, and language customization (Muylle, et al., 2004). For item 1 to item 32 questions, students were asked to provide a response on a five-point rating scale from "most disagree" (1 point) to "most agree" (5 point). Students were also asked for the overall satisfaction at seven-point likert-type scale from "Strongly disagree" (1 point) to "Strongly agree" (7 point).

Data were analyzed by using descriptive statistic and independent t-test at 0.05 level of significance.

4. Research results

4.1 Computer multimedia for mobile device based on BBL concept

The TALENT model based on BBL concept was applied to design computer multimedia for mobile device in this study.

The detail of computer multimedia design for mobile as follow:

(1) Timing: This study divides computer network in to three parts of topology such as Bus, Star and Ring. Each topology content consists of 5 parts that are physical, how it work, cable and connector, pros and cons.



Figure 1 Timing screen design as content

(2) Activities: This study design varieties of activities such as reading e-book, study slide, play simulation, and scenario. Student will learn, search and answer any questions.



Figure 2 Activities screen design as e-book

(3) Learning objective: Student understand 3 topologies such as Bus topology, Star topology and Ring topology. And student can used knowledge in real situation.



Figure 3 Learning screen design as feedback

(4) **Ease of use and Effective:** The user friendly concept was applied. User can use mouse or touch screen to control computer multimedia. And computer multimedia was confirmed by the efficiency such as expert confirmation and experiment confirmation.



Figure 4 Ease of use screen design as menu

(5) **Novelty:** This study design varieties content presentation such as e-book, slide show and simulation. That used to new media for sample students.



Figure 5 Novelty screen design as simulation

(6) **Technology:** This study use mobile device and touch screen command as a new technology.

4.2 Demographic characteristics

There were 95 students participating in this study. Most of them were female (57.89 %), mean of age was 22.09 years old (SD=0.89), and mean of GPA was 3.03 (SD=0.32).

4.3 Effectiveness of learning

The 1st test result revealed that students who used computer multimedia for mobile device based on BBL had statistically higher learning achievement (mean = 4.80, SD=0.72) than those who used traditional learning strategies (mean = 4.20, SD=1.57) at p-value = 0.000 as shown in table 1.

Table 1 The comparison of learning achievement between a students who used computer multimedia for mobile device based on BBL and students who used traditional learning strategies at the 1st test.

Learning method	Mean	SD	p-value
1 st Group: Traditional learning strategies (n=49)	4.20	1.57	.000
2 nd Group: Computer multimedia for mobile device based on BBL(n=46)	4.80	0.72	

And, the 2nd test result shown that students who used computer multimedia for mobile device based on BBL had statistically higher learning achievement (mean = 4.78, SD = 1.13) than students who used traditional learning strategies (mean = 3.80, SD = 1.83) at p-value = 0.000 as shown in table 2.

Table 2 The comparison of learning achievement between students who used computer multimedia for mobile device based on BBL and students who used traditional learning strategies in 2nd test.

Learning method	Mean	SD	p-value
1 st Group: Computer multimedia for mobile device based on BBL(n=49)	4.78	1.13	.000
2 nd Group: Traditional learning strategies (n=46)	3.80	1.83	

The results of computer multimedia for mobile device based on BBL implementation revealed that students who used computer multimedia for mobile device based on BBL had statistically higher overall learning achievement (mean = 9.57, SD = 1.40) than students who used traditional learning strategies (mean = 8.01, SD = 2.63) at p-value = 0.000 as shown in table 3.

Table 3 The comparison of overall learning achievement between students who used computer multimedia for mobile device based on BBL and students who used traditional learning strategies.

Learning method	Mean	SD	p-value
Computer multimedia for mobile device based on BBL(n=95)	9.57	1.40	.000
Traditional learning strategies(n=95)	8.01	2.63	

Table 4 The comparison of learning satisfaction between students who used computer multimedia for mobile device based on BBL and students who used traditional learning strategies.

Dimensions	Students who used computer multimedia (n=95)		Students who used traditional learning strategies (n=95)		p-value
	Mean	SD	Mean	SD	
Information relevancy	3.78	1.12	3.52	1.02	0.000*
Information accuracy	3.72	1.12	3.64	1.05	0.069 ^{ns}
Information comprehensibility	4.40	0.73	3.89	0.94	0.000*
Information comprehensiveness	4.31	0.72	3.90	0.83	0.000*
Ease of use	3.71	1.21	3.41	1.11	0.000*
Entry guidance	3.65	1.23	3.22	1.04	0.000*
Multimedia structure	3.76	1.21	3.40	1.05	0.000*
Hyperlink connotation	3.69	1.16	3.18	1.11	0.000*
Multimedia speed	3.45	1.23	3.19	1.14	0.000*
Layout	3.71	1.29	3.06	1.18	0.000*
Language customization	4.41	0.69	4.03	0.93	0.000*
Overall satisfaction	6.12	0.94	4.85	1.12	0.000*

Data from table 4 showed that students who used computer multimedia for mobile device based on BBL group, the top three dimensions ranking were Language customization (mean=4.41, SD=0.69), Information comprehensibility (mean=4.40, SD=0.73), and Information comprehensiveness (mean=4.31, SD=0.72), respectively.

Students who used computer multimedia for mobile device based on BBL had statistically higher overall learning satisfaction (mean=6.12, SD=0.94) than a students who used traditional learning strategies (mean=4.85, SD=1.12) at p-value = 0.000.

4.4 Behavior of students learning by computer multimedia for mobile device based on BBL

Students who used computer multimedia for mobile device based on BBL group had a good learning behavior. For example, they had an interesting to computer multimedia. They had concentrated to simulation problem solving and content. They had many times to participate with another. And they had happiness and fun. In another hand, students who used traditional learning strategies group had shown the less.

Some students who used computer multimedia for mobile device based on BBL group express that:

“...I like it, because it has simulation that make me easy to understand the content...”
3rd male student ID 236

“...could you please give me one copy of the multimedia for me learning at home?...”
3rd female student ID 113

5. Discussion

The research results are good and effective such as higher learning achievement, higher learning satisfaction and good learning behavior. The design method of computer multimedia for mobile device is based on BBL concept. It consists of 3 elements such as active processing of experience, relaxed alertness, and orchestrated immersion. That called “The three elements of great teaching” (Gulpinar, 2005).

Firstly, computer multimedia design by using the active processing of experience has varieties activities such as text, slide, simulation, and scenario. The effect of these showed that students’ achievement who used computer multimedia had higher overall achievement than another group. According to this result, the BBL researches significant findings indicate that providing learners with manipulative function in multimedia would facilitate their problem solving through reduced cognitive load and improved self-efficacy (Maneepong, et al., 2007; Nakhonratchasima Rajabhat University, 2008; Pongkitwitoon, 2011; Zheng, et al., 2009).

Secondly, learners’ satisfaction who used computer multimedia had higher overall satisfaction than another group. Because of computer multimedia had design by using the relaxed alertness guide. Conformingly, the development of computer multimedia research findings shown that learners who used computer multimedia had higher satisfaction score (Tongpha, 2012; Sawangphonkrang, 2012; Phalatho, 2013; Parpua, 2013)

Lastly, the orchestrated immersion approach by design computer multimedia. It had effect to students’ behavior who used computer multimedia. Learners should shift for a good participation and working together. They had good social skills and happy to learn. According to these, others research finding shown that learners should to turn over a self-assurance, self-studies, team learning and sharing. (Maneepong, et al., 2007; Nakhonratchasima Rajabhat University, 2008; Zheng, et al., 2009).

6. Conclusion

The research results reflect that the students who used computer multimedia for mobile device based on BBL have a better learning achievement and more learning satisfaction than others in the learning process. Moreover, they have a good learning behavior such as interesting, concentration, participation, happiness and fun.

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