Teaching Educational Technology through Project Based Learning (PBL) for 21st Century Success

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ABSTRACT

The objectives of this study were 1) to develop PBL in the teaching process consistent with 21st century learning skills. 2) to evaluate the 21st century learning skills of the students after learning by PBL in the teaching process consistent with 21st century learning skills. Research design was pre-experimental design. This research was implemented from August, 2558 to November, 2558 B.E. The sample was 40 third-year-student who registered in the Educational Technology course during the 1st semester 2558 B.E., Nakhon Ratchasima Rajabhat University, Thailand. The PBL consistent with 21st century learning skills was developed based on literature review and expert panel during the research process. This PBL teaching process was implemented with 40 students during their learning process. The majority of research instruments were the 21st century learning skills. In addition, the researcher applied other research instruments such as observation, and natural conversation to complete data. Data was analyzed by using descriptive statistic and content analysis. The research results reflect that the students who have learnt by PBL have good 21st century learning skills. Moreover, they have good learning behavior such as active learning and fun.

Keyword: PBL, The 21st century learning skills, learning behavior

1. BACKGROUND

Nakhon Ratchasima Rajabhat University has the student centered policy for encouraging students' capability and self-directed learning through a learning process (Nakhon Ratchasima Rajabhat University, 2010). In my experiences as an Educational Technology course instructor, teaching at the undergraduate level, I found that almost all students had learning problems in integrating knowledge and communicating in real-situation. Thus, it was important to develop a more efficient learning process.

Today's students love technology. But to prepare for tomorrow's success, they need to be able to use technology to develop critical thinking, problem solving, and other 21st century skills. To learn effectively and live productively in the 21st century, it is essential for today's students to develop the following sets of skills (ISTE, 2007):

1) Creativity and Innovation (brainstorm; develop new ideas; demonstrate creative thinking)

2) Critical Thinking and Problem Solving (plan and conduct research; solve problems; make informed decisions)

3) Communication and Collaboration (listen effectively; articulate thoughts and ideas; work with others)

4) Digital Citizenship (practice safe and ethical online behavior; understand cultural and societal issues related to technology)

5) Research and Information Fluency(gather, evaluate, and use information; select the right information for the task)

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6) Technology Operations and Concepts (understand how to use technology systems safely, effectively, and productively)

Project-Based Learning (PBL) is an innovative approach to learning that teaches a multitude of strategies critical for success in the twenty-first century (Bell, 2010). Project Based Learning or PBL incorporates real-world challenges where the focus is on authentic real problems or questions and where solutions have the potential to be implemented (Thomas, 2000). PBL is challenging for teachers to enact despite its positive benefits (Center of Excellence in Leadership of Learning, 2009). PBL learning activities are long-term, interdisciplinary, student-centered, and integrated with real-world issues and practices. Motivating and engaging students in active learning is challenging even for the most experienced teachers (Educational Technology Division, 2006).

PBL provides opportunities and vary practices for students to learn deep content knowledge and 21st century skills (Ravitz, Hixson, English, & Mergendoller, 2012). It is a method that fosters abstract, intellectual tasks to explore complex issues. It promotes understanding, which is true knowledge (Educational Technology Division, 2006). Projects should be carefully planned, managed, and assessed to connect rigorous academic content to 21st Century Skills such as collaboration, communication & critical thinking (Mergendoller, Markham, Ravitz & Larmer, 2006). In PBL, students explore, make judgments, interpret, and synthesis information in meaningful ways. It is more representative of how adults are asked to learn and demonstrate knowledge (Educational Technology Division, 2006). It is an important question how can students improve 21st century learning skills and how reform practices can be effectively used with all students.

2. OBJECTIVES

The objectives of this study were:

1) To develop PBL in the teaching process consistent with 21st century learning skills.

2) To evaluate the 21st century learning skills of the students after learning by PBL in the teaching process that is consistent with 21st century learning skills.

3. METHODOLOGY

Research design was pre-experimental design. This research was implemented from August, 2558 to November, 2558 B.E. The sample was 40 third-year-student who registered in the Educational Technology course during the 1st semester 2558 B.E., at Nakhon Ratchasima Rajabhat University, Thailand. The PBL consistent with 21st century learning skills was developed based on literature review and expert panel during the research process. This PBL teaching process was implemented with 40 students during their learning process.

The majority of research instrument was the 21st century learning skills. It consist of 6 evaluation items.

Creativity and Innovation (brainstorm; develop new ideas; demonstrate creative thinking)

Critical Thinking and Problem Solving (plan and conduct project; solve problems; make informed decisions)

Communication and Collaboration (listen effectively; articulate thoughts and ideas; work with others)

Digital Citizenship (practice safe and ethical online behavior; understand cultural and societal issues related to technology)

Research and Information Fluency (gather, evaluate, and use information; select the right information for the task)

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Technology Operations and Concepts (understand how to use technology systems safely, effectively, and productively)

In each item, the score could range between 0 and 10. The level of the 21st century learning skills was defined as Poor, Fair, Good, Very Good, and Excellent.

In addition, the researcher applied other research instruments such as observation, and natural conversation to complete data. Data was analyzed by using descriptive statistic and content analysis.

4. RESEARCH RESULTS

Demographic data

There were 40 students participating in this study. Most of them were female (70.00%). The Mean of age was 19.98 (SD = 0.83) as shown in table 1.

Table 1 The sample demographic data

Variable		n	%	MEAN	SD
▪ Gender	Male	12	30		
	Female	28	70		
▪ Age		40		19.98	0.83

The teaching process by Project Based Learning

1. **Team dividing:** Students have divided into a group of five by their own decision.

2. **Project issue selection:** The project acted as both in-class instructional media and integrated the learning resources and their future instructional media. The researcher motivated each group to create an integrated project with real-world issues and practices. For example, Project "Math by AR" has integrated with learning resources, Phimai Historical Park, mathematical, angle subject, and AR technology.

3. **Project activities:**

3.1 **Plan:** Week 1, each group presents their project idea in a classroom. While the researcher and other student discuss and share idea for improving each project.

3.2 **Search & Design:** Week 2, each group search information, survey a place, design learning media, write a script and prepare materials for instructional media. The researcher provided support in struggle cases such as knowledge or technical problems.

3.3 **Do & Learn:** Week 3-4, students went to their selected place and made a media product. They created learning media. The researcher provided support in struggle cases such as knowledge or technical problems.

3.4 **Show & Share:** Week 5, each group presented their successful project in a classroom. The researcher and other student discussed, share ideas, tried to use, and co-evaluated the developed instructional media for each project.

4 Evaluation: The score of 21st century learning skills was collected from the term beginning until each group complete their project by researcher and peer-recommendation, Total score of 21st century learning skills was summarized.

The 21st century learning skills of the students

The research result revealed that the students have all items of 21st century learning skills in the excellent level after learning by PBL as shown in Table 2 and Figure 1.

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Table 2 Average and level of the 21st century learning skills of the 40 students who participated in this study

Item	MEAN	SD	Level
Creativity and Innovation	9.20	0.69	Excellent
Critical Thinking and Problem Solving	9.40	0.20	Excellent
Communication and Collaboration	9.73	0.68	Excellent
Digital Citizenship	9.13	0.27	Excellent
Research and Information Fluency	8.90	0.30	Excellent
Technology Operations and Concepts	9.30	0.35	Excellent

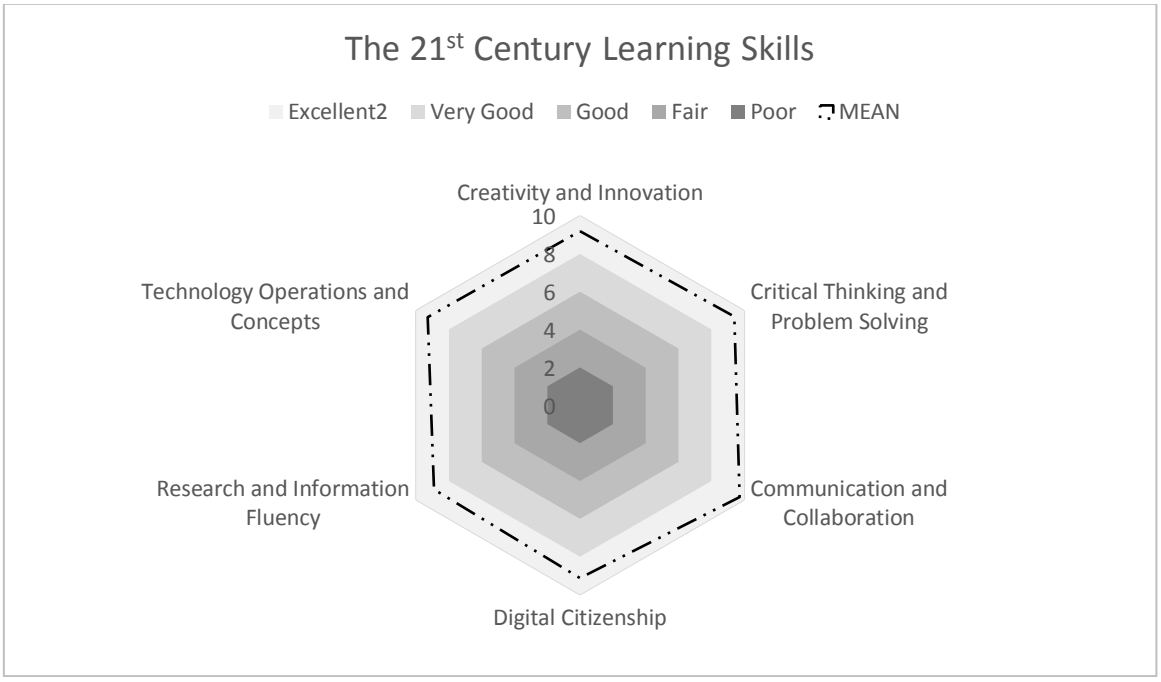

Figure 1 Radar representation of student's 21st century learning skills items

Moreover, students who have learned by PBL had a good learning behavior. For example, they had a creative idea to design a project, they concentrated searching for information, solved a project problem and how to successful projects. They spent times collaborating with another. And they were active, happy and had fun as students express that:

"…I like this learning activity, because I have learnt a new technology and I have understood about Phimai Historical Park memorial …" 3rd student #1

"…I feel happy and fun when I go to the Zoo and I have learnt about Zoo activities… " 3rd student #20

"…I should come back to Archaeological site Banprasat again because my group want more information on site for fulfill the project…" 3rd student #33

5. DISCUSSION

The research results are effective for 21st century learning skills in item of Creativity and Innovation, Critical Thinking and Problem Solving, Communication and Collaboration, Digital Citizenship, Research and Information Fluency, and Technology Operations and Concepts. This effective result may emerge from the key features of the Project-based approach (Harmer, 2014) that (1) Learning by doing (2) Real world problems (3) Role of the

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tutor: 'a guide-on-the-side' (4) Interdisciplinarity (5) Collaboration and group work and (6) An end product are relatively with 21st century learning skills. In PBL the student role changes from learning by listening to learning by doing (Stauffacher et al., 2006). The central position of praxis within the approach links to a further important characteristic: that of the doing being centred on real life problems which capture students' interest (Lehmann et al., 2008).

The connection between academia and external social, political, and environmental realities is argued to engender and sustain student interest and motivation (Bell, 2010). The role of teacher or lecturer in PBL shifts from "sage-on-the stage" to "guide-on-the-side" (Nation, 2008: 109). As Stauffacher et al. (2006) explain: "The teacher's role changes from a distributor of knowledge to a process manager, helping students in their learning process by initiating reflection processes and supporting them, if necessary, on substantive matters". What is more, learning derives also from the knowledge, ideas and interactions between students in the group (Frank, Lavy & Elata, 2003). Also central to PBL is the use of group work (Von Kotze & Cooper, 2000). Thus the process of team working, and the skills and qualities this engenders, form part of the learning outcomes. (Danford, 2006). Collaboration can also include partners external to academia (Stauffacher et al., 2006; Cheung & Chow, 2011) such as community groups (Jarmon et al. 2008), leading to the development of further professional skills, behaviours and networks. However, while leading to valuable skills, group work is also identified as holding potential for conflict and student dissatisfaction as discussed. (Harmer, 2014)

Furthermore the product is usually shared, either among peers and academic staff or external audiences such as partners in the community or business sector (Danford, 2006), although according to Bell it is important that the chosen target audience be "authentic and appropriate" (Bell , 2010).

6. CONCLUSION

The research results reflect that the students who have learnt by PBL have a good 21st century learning skills. Moreover, they have a good learning behavior such as active learning and fun.

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