Activity-based Learning by Using a Social Network Critical Reflective Practice Together with Project-based Learning: A Case of the General Education Subject, Suan Dusit University

Arpaporn Angsachon* and Saisuda Puntrakool

Suan Dusit University, Thailand

Abstract

This research aimed to study the learning achievement of students before and after activity-based learning by using a social network critical reflective practice together with project-based learning. The sample population consisted of sophomore Suan Dusit University students studying the early childhood education curriculum who were enrolled in the information technology course (general education subject). A total of 115 second-year students in the Early Childhood Education faculty, from Section I1 and J1 of the Information Technology course during the first semester of the 2013 academic year, were selected. Research tools were composed of: 1) the teaching plan, 2) the students' behavior observation form, 3) the achievement test, and 4) the satisfaction evaluation form. The data was analyzed using percentage, mean, standard deviation, and independent t-test. Research results demonstrated the following: 1) there were four stages in students' behaviors observation which were planning stage, operation stage, presentation stage, and evaluation and future learning stage; the results demonstrate the activity and project-based learning stage preferences of the majority,2) the achievement evaluation found that most students had higher learning achievement outcome after attending class ($p<0.05$), and 3) the overall satisfaction of the students was neutral; ranked from the most to the least were the creation of an atmosphere in the classroom and the participation in learning activities among students and teachers.

Keywords: Activity-based Learning, critical Reflective Practice, project-based Learning, social Network

* Corresponding Author
e-mail: arpaporn_ang@dusit.ac.th

Introduction

Applying information technology as teaching tools in Thailand has increased rapidly in order to prepare students readily for the digital age and the 21st century skills. The reform of Thai education in order to arise in the future as a nation of wealth, stability and dignity, capable of competing in the age of globalization is needed (Office of the National Education Commission, 1999). According to the National Education Act, B.E. 2542 (1999), the learning process shall aim at acquiring the thirst for knowledge and capability of self-learning on a continuous basis with lifelong education for all, and the principle organization system shall be mobilization of resources from different sources for provision of education. In order to prepare and teach the students to use information technology for their future education and interests, classroom teaching needs to enable everyone to succeed at the same level.

A social network or online community is a website, a virtual community or a profile site, that brings people together to talk or connect with friends and family, share ideas and interests, make new friends, share photos, videos, music and other personal information with either a select group of friends or a wider group of people, depending on the selected settings. It is the active-based network, in the form of web services, designed to support the exchange of data among computers in the network and support sharing of information. The most popular activity carried out on mobile devices by internet users was communication through social network sites, such as Facebook, Instagram, and LINE at 82.7 percent (Electronic Transactions Development Agency (Public Organization), 2016). This type of collaboration and sharing of data is often referred to as social media platform. There are tons of different social networks that you can join for free. Examples of social networks are Bebo, Classmates, Facebook, Friendster, Google+, Instagram, LinkedIn, MySpace, Orkut, Path, Pinterest, Reddit, StumbleUpon, Tumblr, Twitter, Yik Yak, and YouTube (Affilorama Group, 2016; Chaleaysab et al., 2012; Computer Hope, 2016; Whatis.com, 2016).

An important innovation in education for the 21st century is Activity-Based Learning (ABL) which applies new techniques or technologies to transform teaching and learning in order to provide students a way to experience and interact with ideas and information. Instead of transmitting information to the student as is commonly done in a lecture, activity-based learning connects students with real situations and practical problems, increases student engagement, and creates opportunities for meaningful collaborative work. In general ABL is convenient, easy to use, and transform the traditional teaching methods aligning and blending with pre-existing education pedagogy, competency mapping and assessment (Gupte et al., 2016). ABL has been proved successful teaching model in the field of medicine, engineering and science, and also business schools. ABL as a tool integrates learning within students' knowledge by exposing them to a variety of activities that help them learn how to learn. As ABL requires high degree of participation, essential instructor skills involve

facilitating, motivating, enabling and coaching rather than simply presenting facts and figures didactically. The integration of ABL elements are aimed at enhancing learners' management knowledge, skills, and problem-solving abilities (Singh, Sharma, & Sapam, 2014). ABL focuses on the real action and learning from actual experience. Sripatum University of Thailand has announced the new designed ABL oriented curriculum in order to produce the smart human resource graduates and serve the growing global business (Lertpaitoonpan, 2014).

Critical Reflective Practice is a reasoning process to make meaning of an experience with descriptive, analytical, and critical faculties. It can be articulated in various presentation patterns such as in written form, orally, or as an artistic expression. In short, critical reflective practice adds depth and breadth to an experience and builds connections between course content and the experience. Reflection models are based on a philosophical approach to assist students develop and understand of critical reflection. There are four steps to create critical reflection: 1) Identify the student learning outcomes related to the experience, 2) Design the reflection activities to best achieve the outcomes, 3) Engage students in critical reflection before, during, and after the experience, and 4) Assess their learnings. It is a form of reflection that is complicated as well as challenging for the learner and the educator. (Lucas, 2012; SkillsYouNeed.com, 2016; ThinkAchieve: Creating Connections, 2016).

Project-Based Learning (PBL) is a teaching method focused on student learning goals, including standards-based content and skills such as critical thinking/problem solving, collaboration, and self-management. PBL stimulates learners' knowledge and skills by working for an extended period of time to investigate and respond to an authentic, engaging and complex question, problem, or challenge (Buck Institute for Education, 2016). PBL increases long-term retention of content, helps students perform as well as or better than traditional learners in high-stakes tests, improves problem-solving and collaboration skills, and improves students' attitudes towards learning (Vega, 2015). During working in project-based learning, students will be assigned alternative projects that require their diverse skills such as researching, writing, interviewing, collaborating, or public speaking to produce various kinds of output such as research papers, study reports, project proposals, multimedia / videos / animations / illustrations or mixed patterns of presentation, or musical and theatrical performances. In project-based learning, students are usually given a general question to answer, a concrete problem to solve, or an in-depth issue to explore. Teachers act as facilitators to encourage students to choose specific topics that interest or inspire them, such as projects related to their personal interests or career aspirations (Coffey, 2016; Project-Based Learning, 2013).

There are varieties of knowledge sharing on social network. Students can study at any time by themselves. This necessitates the teacher to handle learning differently in the digital age. The role of the instructor changes to facilitate learning, rather than direct tuition. This research applied with the constructivism of Piaget's theory via activity-based learning. The stage in cognitive development for this research was the formal operational stage, which is the proper level for adolescence and adulthood (Huitt & Hummel, 2003; McLeod, 2015). The project-based learning researched learning and how to improve the creativity of the students. The researcher, an instructor of Information Technology course, was interested to do classroom research about activity-based learning by using a social network critical reflective practice together with project-based learning with students of Suan Dusit University.

Objectives

The objectives of this study were: 1) to study the learning achievement of students before and after the activity-based learning by using a social network critical reflective practice together with project-based learning and 2) to explore the students' satisfactions with this method.

Methodology

This classroom research used a case study in the activity-based learning, social networking, together with a review of the technical project-based learning with Information Technology course (general education subject) of Suan Dusit University.

1. Population and samples

1.1 The population in this study was the sophomore students from the Early Childhood Education programs who were enrolled in the Information Technology course (general education subject) during the first semester of the 2013 academic year; the total number of students was 115 (58 students from section I1 and 57 students from section J1).

1.2 The required sample size was 92 students, determined by Yamane formula at 95% confidence level; 46 students were obtained from each section using simple random sampling.

2. Research tools

Four research instruments used in this study were: 1) the Information Technology teaching plan, 2) the students' behavior observation form, 3) the achievement test, and 4) the satisfaction evaluation form. Development of the tools was as follows:

2.1 Tool designing and qualities assessment

2.1.1 The Information Technology teaching plan

The teaching plan of the activity-based learning by using a social network critical reflective practice together with project-based learning of Information Technology course had been organized by:

1) Study and detailed analysis of the course contents for planning the weekly teaching and learning activities, the expected outcomes, and the assessment processes.

2) Creation of the teaching plan of 8 chapters for 16 weeks, excluding the pre and posttest. The lessons were:

2.1) Chapter 1: Computer technology

2.2) Chapter 2: Data communication technology

2.3) Chapter 3: The Internet

2.4) Chapter 4: Social network

2.5) Chapter 5: Online database and retrieval

2.6) Chapter 6: Information and knowledge management technology

2.7) Chapter 7: Laws, ethics and safeties in using information technology

2.8) Chapter 8: The applications of information technology for life

3) Consultation with the educational expert to check the finished learning plan, edit, and receive suggestions for the improvements, the content validities, the relevance of expected learning outcomes, and the correction guides.

4) Test the teaching plan by calculating the average level and comparing it with the acceptance level. The average range of 3.51-5.00, “high suitably” to “highest suitably”, signified a good teaching plan.

5) Revision and improvement of the teaching plan according to the expert’s comments before experimenting with the sample group.

2.1.2 The students’ behavior observation form

Researchers designed the observation form to collect the behavioral data of students during the semester instructions and activities. An analysis and summary of the

observation data was provided in the descriptive report for teaching assessment and feedback improvement information to develop future teaching plans. The design steps were as follows:

1) Review of various styles of the observation technique to create the study observation form.

2) Definition of the scopes of study about the atmosphere of activities class and students' behaviors.

3) Creation of the observation form

4) Elicitation of advice, feedback, and approval from the expert.

5) Revision and completion of the students' observation form before use with the target group.

6) Data collection by observation and recorded students' behaviors.

2.1.3 The achievement test

The achievement test had a total 30 questions and each question had 5 choices. It was used to assess students' learning outcome with the pretest before joining activities and the posttest after attending the course. The achievement test preparation procedures were:

1) Research information about patterns, purposes, and examples of the classifications of achievement test.

2) Composition of the achievement tests (2 papers: pre-test and post-test)

3) Determination of the scoring criteria of the test:

- correct answer = 1 point
- wrong answer/ no answer/ more than one answer = 0

4) Evaluation of the content validity of the questions with the professional expert to find the Index of Item-Objective Congruence (IOC) of the test with the expected index greater than or equal to 0.5. The index result of all questions was 0.5-1. The achievement test was qualified.

5) Pilot test of the qualified questions to measure their effectiveness with 30 students external to the study; all answers were checked in order to analyze the difficulty and the discrimination. The report showed that the difficulty (p) was between 0.07-0.95 and the discrimination (r) was between -0.01-0.66. After that, 30 questions were selected with the difficulty range of 0.24-0.94 and the discrimination range of 0.10-0.56.

6) Measurement of the reliability of the 30 questions test with non-sampling students by using Kuder-Richardson formula 20 (KR-20); the result was 0.892.

7) Improvement and correction of the complete achievement test for use with the target students.

2.1.4 The satisfaction evaluation form

At the end of the course, there was the assessment of students' opinions about the satisfaction level of the activity-based learning by using a social network critical reflective practice together with project-based learning. The satisfaction evaluation form had been constructed as follows:

2) Determination of the aims and scopes of the evaluation issues according to assess the acquiring methods for knowledge.

3) Study of the relevance information and related researches.

4) Creation of the evaluation questionnaire based on research objectives; responses were constrained to a 5-point Likert scale, ranging from strongly agree to strongly disagree. The evaluation topics consisted of 3 facets with a total 18 items: 1) the creation of an atmosphere in the classroom with 6 items, 2) the activities in project-based learning with 7 items, and 3) the participation in learning activities among students and teachers with 5 items.

1) Consultations with the educational expert in order to elicit advice, critique the form, and obtain comments for improvement.

5) Arrangement and improvement of the satisfaction evaluation form before applying it to the study group.

2.2 Data collection

2.2.1 Observation and recording students' behaviors had been done during the semester.

2.2.2 The pre-test for the critical thinking skills was delivered at the beginning of the class and the post-achievement test was delivered at the end of the semester.

2.2.3 Collection of the students' satisfaction evaluation data at the end of the course.

2.3 Data analysis

2.3.1 Qualitative data: content analysis was used for the behavior observation data and presentation consisted of a descriptive summary.

2.3.2 Quantitative data: statistical values were computed for percentage, average, standard deviation, and t - test dependent.

Results

The study results of the activity-based learning by using a social network critical reflective practice together with project-based learning can be summarized as follows:

1. Students' behaviors of Information Technology course

There were four stages in students' behaviors observation – planning stage, operation stage, presentation stage, and evaluation and future learning stage.

1.1 Planning stage

From the observation, it showed that Information Technology course was an interesting subject and the majority of students had attended with interest, curiosity, and eagerness to share ideas and discussions. When the class set up the activities via the social network under the working project, learners enjoyed the participation and could select the study topics based on their own interests in order to find the answers or gain knowledge from project-based learning. During the project work, students engaged in group discussion, opinion sharing, project planning, duty distribution, and responsibility recognitions. The learning experiences from planning the project to solve their topic, researchers observed that some groups were still hesitant about how to start their plans, could not arrange the job sequence (what should be do prior or later), did not know where and how to find information, and could not make final decision or agreements on varieties of ideas. As the group counselor, the teacher advised students to start their project by asking themselves "what" was the question or topic they wanted to know or were interested in. Questioning was employed because it leads to inspiration, scientific thinking, definitions of the experiment, and learning methods to find the answer. After students had selected their own group topic, the teacher continued to support their learning by teaching them to be open minded and listen to opinions/ideas of others, guided them how to gain benefits from a variety of ideas, and suggested alternatives methods for project planning. In this stage, the teacher demonstrated how to train students to recognize questions, find answers on their own, continue the next step with a keen interest in thinking skills, and have higher academic achievement.

1.2 Operation stage

Students in every group very actively worked together in order to find answers, as planned. They managed the group operations according to each member's skills to do research for their solution such as searching data from library, internet, other learning sources, or interviewing academicians or IT experts. When they collected enough data, students executed data to get the solutions or the answers to their questions and completed the purpose of the project. However, there were still problems with some groups because they

could not follow and complete the project, as planned. The major problem was irresponsibility for completing their duties. Therefore, researchers suggested that they adjust their plan, attempt processes again, do more research, re-design the plan, and rearrange group responsibility to fit member's skills. When the study finished, learners could complete everything in their plans. Students had learned from real practice to illustrate the importance of effective planning, group harmony, maintaining patience, making attempts, accepting other opinions, and working as a team.

1.3 Presentation stage

This project used social network as communication channel therefore the presentation were conducted via Facebook, the most popular social network in Thailand, (Electronic Transactions Development Agency, 2016). The class set up a closed group page for presentation and communication among members of the group. Benefits of a closed group were teachers could control and audit the contents of posts to check the correctness and reliability, and verify the information presented before sharing with the public. Students were more interactive in Facebook than in the classrooms and they felt more comfortable expressing opinions through online posts than offline class. They could present the information and analyze content concisely and in sequence. Idea sharing, knowledge exchange, class discussion, creativity opinion, and member cooperation were examples of the students' experience in the learning process. As a facilitator, teachers assist learners to help solve problems of the groups such as an inability to find enough data to summarize the result, supported by correcting the data and advising the appropriate learning sources for searching. Findings in this stage were that the students could relate to the learning process, analytical skills, and clearly understood how to do the summary reports.

1.4 Evaluation and future learning stage

Each group could apply the knowledge gained from project-based learning and exchange knowledge and experience within their group and between other groups. Researchers randomly selected two groups to present in classroom. The results showed that the learners could explain all processes from the planning stage to presentation stage, answered questions, and organized the discussion well. It demonstrated that students clearly understood and could explain their knowledge or experiences to other people, and had good opportunities to assess their own works and friends' works. The majorities of students were satisfied with the activity-based together with project-based learning whereas some students still were shy and did not share ideas or discuss with others. Researchers motivated by allowing them to present with their own styles, and encouraging a comfortable zone and friendly atmosphere. Students can apply these experiences with further studying of other subjects and alternative self-learning.

Figure 1 Group members consisted of teachers and students

Figure 2 Examples of project presentation and communication between teachers and each group

2. The achievement test assessment

The assessments of students' achievement in Information Technology were tested before and after learning with the sample of 92 students from the Early Childhood Education program. The achievement assessment results of pre-test and post-test are shown in the Table 1.

Table 1 Comparison of the achievement test results between before and after learning with the activity-based learning by using social network critical reflective practice together with project-based learning.

Achievement result	N	$\overline{\chi}$	S.D.	t	p
Before learning	92	10.89	0.48	-15.26	0.001
After learning	92	15.10	0.43		

$p < .05$

As can be seen from Table 1, the achievement assessment (the 30 question test with 5 multiple choices per question) results demonstrated that students earned higher average scores after attending the activity-based learning ($p<0.05$).

3. The satisfaction of the students

The satisfaction evaluation of the students conducted at the end of the semester about the activity-based learning by using a social network critical reflective practice together with project-based learning was divided into 3 aspects: the creation of an atmosphere in the classroom, the activities in project-based learning, and the participation in learning activities among students and teachers. The results are shown in Table 2.

Table 2 Summary of the students' satisfaction evaluation

Learning activities	$\bar{\chi}$	SD	Opinion level	Rank
The creation of an atmosphere in the classroom	***3.39***	***0.82***	***Neutral***	
1. Classroom condition could support learning ability.	3.32	0.92	Neutral	6
2. Teacher had good personality and friendly.	3.39	1.05	Neutral	4
3. Teacher had fair judgement.	3.33	0.89	Neutral	5
4. Teacher had an open mind, gave a chance, and listened to all students' feedback.	3.44	0.95	Neutral	1
5. Teacher gave students a chance to express their opinions and share ideas.	3.42	0.99	Neutral	2
6. Teacher took care of every student and supported students thoroughly.	3.39	0.98	Neutral	3
The activities in project-based learning	***3.55***	***0.71***	***Agree***	
1. Appropriate topics	3.75	0.82	Agree	1
2. Practice group planning	3.53	0.93	Agree	4
3. Practice operations in real situation	3.29	0.95	Neutral	7
4. Practice to be self-courageous	3.50	0.95	Neutral	5
5. Practice creative thinking	3.65	0.80	Agree	2
6. Group evaluation and self-assessment	3.63	0.91	Agree	3
7. Interesting activities	3.25	0.89	Neutral	6
The participation in learning activities among students and teachers	***3.38***	***0.78***	***Neutral***	
1. Participation in learning activities	3.55	0.97	Agree	1
2. Applicable knowledge in daily life	3.42	0.98	Neutral	4
3. Interesting media and learning sources	3.25	0.88	Neutral	5
4. Proper measurement and assessment	3.42	0.92	Neutral	3
5. Overall aspects of project-based learning	3.45	0.99	Neutral	2
Total	**3.44**	**0.68**	**Neutral**	

From Table 2, the results showed that the majority of students were satisfied with the overall aspects of the research project at the neutral level ($\bar{\chi}$ = 3.44, SD = 0.68). The findings ranked in sequence are the activities in project-based learning at the agree level ($\bar{\chi}$ = 3.55, SD = 0.71), the creation of an atmosphere in the class at the neutral level ($\bar{\chi}$ = 3.39, SD = 0.82) and similar to the participation in learning activities among students and teachers ($\bar{\chi}$ = 3.38, SD = 0.78).

Conclusion and Discussion

This classroom research emphasized increasing students' learning ability by combining the activity-based learning and the project-based learning as methods for designing the lesson plan and classroom activities by applying a social network as a communication channel, discussion area, and forum for the final project to public. Researchers selected Facebook as the activity platform because this social network was the most popular social network in Thailand. Its features provided an easy tool to eliminate the illiteracy usage, diminished the limitations of working place and time, and was a related channel to the Information Technology subject. There were four mixed method instruments (qualitative and quantitative) to collect data. A summary of the results about students' participation observation, learning assessment, and the students' satisfaction survey are presented below.

The descriptive summary of students' behavior findings demonstrated that the majority of learners were interested in every activity and the project-based learning, which consisted of four stages. During the first stage, the planning stage, the teacher promoted students with equal opportunities to raise the questions or unknown stories and discuss in order to select a topic for the project. In this stage, the teacher gave the scope of the area study and let students set up groups, practice analyzing problems, plan their project, express a varieties of ideas, and worked together. The planning process promoted initiative, diligence, critical thinking, creativity, and role responsibility. Second, the operation stage to conduct a study on the implementation of the project emphasized teamwork practice, collaboration, imagination and expression of ideas into actions, and solving conflict. During the presentation stage, or the third step, the teacher gave a chance for all members to present their output in class. Each group described all phases of the project from the early steps until completion. They exercised presentation skills for both preparation and speaking. The final stage was the evaluation and future learning which cooperation between teachers and students to assess the output and discuss the implementation for developing new knowledge or further study. This is related to the work of Arantes do Amaral, Gonçalves, and Hess (2015) that created support project management graduate courses to improve project management skills of graduate students, and Genc (2015) that showed that project-based learning had a positive effect on students' environmental attitudes.

The achievement of student's learning from the examination demonstrated that this learning project had increased the learning outcome of students, as evidenced by higher posttest scores ($p<0.05$). The experimental learning method taught the student to learn to think creatively from the planning and implementing of four stages. Students had the opportunity to participate and take action in the project by themselves; this truly affected learning and improved recognition. As a result, the achievement of learners improved as can

be seen from the average achievement scores after learning, relative to the control curriculum. This is consistent with the findings of Kara and Celikler (2015) that using the test with Kuder Richardson-20 reliability coefficient is estimated to be 0.763, and the result of the study was the creation of an effective and reliable achievement test comprised of 32 questions with intermediate difficulty level and good distinction strength for the "Matter Changing" unit of the science curriculum.

The questionnaire survey of students' satisfaction with this course found that learners were satisfied with overall project learning activities. The statistics revealed that students preferred most the activities of project-based learning, followed by the creation of an atmosphere in the classroom, and the participation in learning activities among students and teachers. It can be inferred that creation of interesting activities, promoting new learning techniques and a motivated environment could lead students to feel surprised, relaxed, friendly, and enjoyment. They had opportunities to work as a team, trust in member's responsibilities, exchange experiences, create and share opinions, and demonstrate keen interest to learn new things. These findings are consistent with the research of Kane, Shaw, Pang, Salley, and Snider (2016) that demonstrated that understanding the factors that influence online student satisfaction and success is vital to enable administrators to engage and retain important stakeholders, and Gray and DiLoreto (2016) that showed that course organization and structure, student engagement, learner interaction, and instructor presence accounted for considerable variance in student satisfaction and perceived learning in online learning environments through a range of pathways.

The concept of activity-based learning, together with project-based learning for classroom research, was chosen to study students' reflections and determine the success of learning methods with respect to learning outcomes. It would seem that the activity-based learning by using a social network critical reflective practice together with project-based learning is generally quite difficult to understand and implement, but this appears to be attractive on further research.

Recommendations

This classroom research was conducted in order to increase students' learning abilities and develop skills for self-learning by applying social networking with project-based practices. Further studies are required to clearly identify the concept of critical reflection in cooperative with activity-based learning and topics for project-based education. Using reflective practice is an active, dynamic action-based and ethical set of skills, placed in real time and dealing with real, complex and difficult situations. An activity with critical reflection has huge benefits in increasing self-awareness, which is a key component of

emotional intelligence, and in developing a better understanding of others. It can also help to develop creative thinking skills, and encourages active engagement in work processes.

1. Suggestions to improve teaching in the future are:

1.1 Instructor should ask questions to stimulate learners' attention, endeavor to learn more for finding the answer or new knowledge on their own.

1.2 Instructor should manage appropriate activities schedule that is adjustable and flexible to students and use other social network as communication channel and learning tools.

1.3 Instructor should share interesting topics, or news, or hot issues to interact with students.

2. Recommendations for further study are:

2.1 The study should be covered with other social network especially the professional group network, and apply with the major subject of the program.

2.2 The study should continue with the comparison of the effect of various types of activity and project learning approach to other teaching methods.

2.3 The study should apply other theories, for example: the Bloom's taxonomy with the project-based learning to cover more learning domains.

References

Affilorama Group. (2016). *What is a social network?*. Retrieved from https://www.affilorama.com/internet101/social-networks

Arantes do Amaral, J. A., Gonçalves, P., and Hess, A. (2015). Creating a Project-Based Learning Environment to Improve Project Management Skills of Graduate Students. *Journal of Problem Based Learning in Higher Education, 3*(2).

Buck Institute for Education. (2016). What is Project Based Learning (PBL)?. Retrieved from http://www.bie.org/about/what_pbl

Chaleaysab, S., Angsachon, A., Puengkong, K., Khantama, T., Tumnanjit, B., Suanpang, P., . . . Puntrakool, S. (2012). Information Technology. Bangkok: Suan Dusit University.

Coffey, H. (2016). Project-based learning. Retrieved from http://www.learnnc.org/lp/pages/ 4753

Computer Hope. (2016). *Social network definition*. Retrieved from http://www.computerhope.com/jargon/s/socinetw.htm

Electronic Transactions Development Agency (Public Organization). (2016). *Thailand Internet User Profile 2015.* Retrieved from https://www.etda.or.th/documents-for-download.html

Genc, M. (2015). The Project-Based Learning Approach in Environmental Education. International Research in Geographical and Environmental Education, 24(2).

Gray, J. A., and DiLoreto, M. (2016). The Effects of Student Engagement, Student Satisfaction, and Perceived Learning in Online Learning Environments. International Journal of Educational Leadership Preparation, 11(1).

Gupte, G., Wolff, J., Bonawitz, R., Lowe, R., Ananthakrishnan, S., and Maalouf, A. (2016). *Workshop A: Activity-based learning disruptive innovation in education across three schools.* Retrieved from http://www.bumc.bu.edu/jmedday/2016-workshops/activity-based-learning-disruptive-innovation-in-education-across-three-schools/

Huitt, W., and Hummel, J. (2003). *Piaget's theory of cognitive development.* Retrieved from http://www.edpsycinteractive.org/topics/cognition/piaget.html

Kane, R. T., Shaw, M., Pang, S., Salley, W., and Snider, J. B. (2016). Faculty Professional Development and Student Satisfaction in Online Higher Education. Online Journal of Distance Learning Administration, 19(2).

Kara, F., and Celikler, D. (2015). Development of Achievement Test: Validity and Reliability Study for Achievement Test on Matter Changing. Journal of Education and Practice, 6(24).

Lertpaitoonpan, W. (2014). *The Curriculum Focuses on The Activity Based Learning at Sripatum University.* Paper presented at the The 2nd Conference of the Higher Education commission of the North Central network area, Chulalongkorn University. August 6-7, 2014. Retrieved from http://www.mua.go.th/users/he-commission/t-visit%20project/t-visit%20book%202/19--g2--12-1.pdf

Lucas, P. (2012). Critical reflection. *What do we really mean?* Paper presented at the ACEN 2012: Collaborative Education: Investing in the future, Geelong

McLeod, S. (2015). *Jean Piaget.* Retrieved from http://www.simplypsychology.org/piaget.html

Office of the National Education Commission. (1999). *National Education Act, B.E. 2542* (1999). Retrieved from http://planipolis.iiep.unesco.org/upload/Thailand/Thailand_Education_Act_1999.pdf.

Project-Based Learning. (2013). *The glossary of education reform.* Retrieved from http://edglossary.org/project-based-learning/

Singh, E. H., Sharma, P. K., and Sapam, R. (2014). Activity based learning in business schools: An observation at royal university of bhutan. Sai Om *Journal of Arts & Education,* 1(7).

SkillsYouNeed.com. (2016). *Reflective Practice.* Retrieved from http://www.skillsyouneed.com/ps/reflective-practice.html

ThinkAchieve: Creating Connections. (2016). *Critical Reflection.* Retrieved from http://www.utc.edu/think-achieve/critical-reflection.php

Vega, V. (2015). *Project-Based Learning Research Review.* Retrieved from http://www.edutopia.org/pbl-research-learning-outcomes

Whatis.com. (2016). *Definition of social networking.* Retrieved from http://whatis.techtarget.com/definition/social-networking

Author

Arpaporn Angsachon
Suan Dusit University
295 Rachasima Road, Dusit, Bangkok 10300
Email: arpaporn_ang@dusit.ac.th

Saisuda Puntrakool
Suan Dusit University
295 Rachasima Road, Dusit, Bangkok 10300