

A conceptual framework of a flipped classroom by project-based learning by analyzing of student's on David Kolb's learning styles

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Abstract

This research is focused on 1. Synthesizing a framework of a Flipped Class Room by Project-Based Learning by Analyzing of Student's on David Kolb's Learning Styles. 2. Experts' evaluation on the flipped classroom approach through project-based learning by David Kolb's to craft a learning model. This research compiled into 5 phases; 1) Surveying problems and reviewing literature 2) Synthesizing a framework of learning style 3) Determining the relevant groups 4) Presenting the conceptual framework 5) Reviewing, revising and summarizing the result.

From research result, it is found that 1) the obtained flipped classroom approach through project-based learning by relying on the analysis result of David Kolb's learning theory which is known as FC-PjBL-Kolb's. This model consists of Input and Output Process while modules are as following; 1) Input 1.1) Student 1.2) Kolb's Testing 1.3 Kolb's classifying Module 1.4 Teacher 2. Process 2.1 Online learning Module 2.2 Content database 2.3 Kolb's Flipped and PjBL Learning Module 3. Output 3.1 Evaluation Module 3.2 Rubric Evaluation 3.3 Examiner Module 3.4 Project DB Module 2) Evaluation result from 10 experts is at the excellent level with 4.66 ± 0.49 also in the conclusion as well as this model had been approved by 10 experts to the development on further phase.

Keywords: Flipped classroom, project-based learning, David Kolb's learning styles

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1. Introduction

There are varieties of teaching and learning processes that link to several factors and learners play an important role as a factor will differ from the process of learning design which related to their aptitudes and awareness that promotes the achievement of learners' the most benefit. Learning and teaching in higher education focus on providing students with three knowledge skills, cognitive, affective and psychomotor domain which helps them to develop into a skilled career. The development of high human resources can encourage and support the growth of a country.[1] As a result, class management must be aware of these factors. Hence, the majority of classroom managements still operate as a content-oriented and provide a vague learning outcome for the individual learner which affects long term learning in a particular subject. Thus, the flipped classroom is one of the solutions that ease problems from learning. The flipped classroom is a reverse learning style by letting the learners to study by themselves before expanding their understanding of their experience on later stage on their own powerful skills which associates with the 21st Century Skills. [2] Research result has found that 100% of 96 students from Computer Education subject of Nakhon Pathom Rajabhat University revealed that flipped classroom with a content presented in video treatment satisfied them at the highest level as the following points, 1) Students are able to review their lesson by watching video 2) Students comment that the video attracted them to learn 3) Students are able to review their lesson by watching video anytime they prefer 4) Since proceeding the only lecture in class leads students to be bored, the video magnets them back to the lesson and 5) Solving problem due to students are lack of readiness which goes along with the

research of Pimprapa [3] She cited that students are interested and satisfied in learning through social media that copes with flipped classroom which they are able to explore through surfing internet. This escalates their motivation and to enjoy doing group work. Furthermore Denduang S, Rodhetbhai C, and Keeratiburana Y. [4] research claimed that e-books are not only interesting but also convenient to read anywhere. They can save a lot of money and time. People can learn from them by using computers, tablets, or any kind of electronic devices such as smartphones. The electronic books are considered as an educational innovation, which is widely accepted by educators.

An interview of University lecturers found that there are several obstacles that emerge from the difference of ability, learning aptitude and classroom management. These mentioned difficulties are not new on the other hand, researchers are on the searching for tools to be used for solving these problems that concerns with their age and context. So, the group of high competency tends to respond better than another side of group referring to quote of Kolb "teachers critically evaluate the learning provision typically available to students, and to develop more appropriate learning opportunities and educators should ensure that activities are designed and carried out in ways that offer each learner the chance to engage in the manner that suits them best and everyone responds to and needs the stimulus of all types of learning styles to one extent or another - it's a matter of using emphasis that fits best with the given situation and a person's learning style preferences." 4 styles 1) Diverging (feeling and watching - CE/RO) 2) Assimilating (watching and thinking - AC/RO) 3) Converging (doing and thinking - AC/AE) and 4) Accommodating or Executive (doing and feeling - CE/AE) [5].

According Figure 1, result of surveying about learning style refers to David Kolb's theory of 1,446 students in bachelor degree from computer group of Thailand western region Universities (Nakhon Pathom Rajabhat University,

Kanchanaburi Rajabhat University, Muban Chombueng Rajabhat University and Phetchaburi Rajabhat University) found that each university possesses individual learning style while the minority of data owns variety and single learning style. However, the dominant learning style in this survey is Convergers as shown in Figure 2.

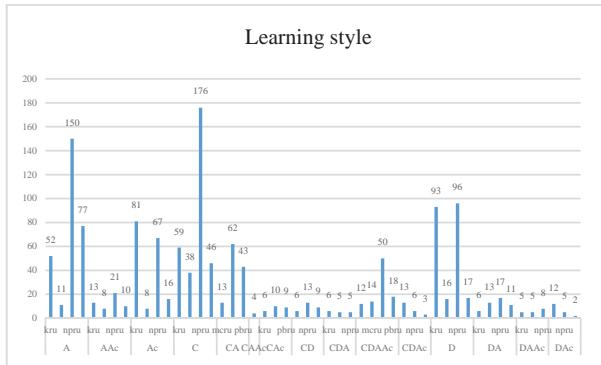


Figure 1. Survey result of computer major bachelor degree of Thailand western region Universities

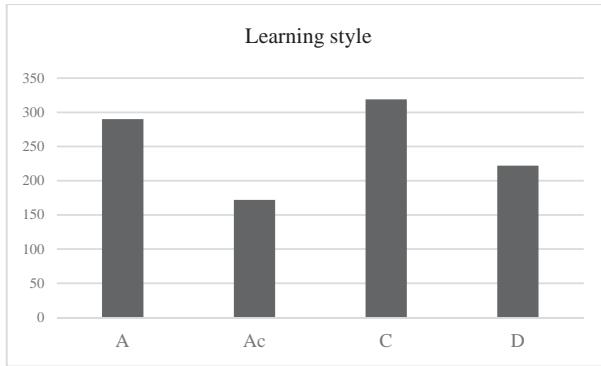


Figure 2. Survey result of computer major bachelor degree of Thailand western region Universities refer to David Kolb's theory

For previous information provided reflects the different style of learning of learners as Phanika Duangkamol and Monchai [6] revealed that the different of learning style concerning to learners aptitude will assist educators to manage a proper class and will motivate learners to engage and construct their highest ability of learning outcome.

The project based had been approached in the research since the diversity of learning styles affixation that contributes learners in utmost dimension. Due to activities in the project based are systematically processed, procedure on study and research on a particular topic and finding out the solution themselves. Project Central Learning style is a process students' learning, collaborate, inquire, search, analyze, evaluate and create among peer activity and cooperating to cope the obstacles and to accomplish the systematic thinking as well as learning outcomes crafted them to collaborate with

cooperatives and linked with a National Education Plan that emphasized on collaboration skill, teamwork and leadership skill. As an exploration result of Sumalee [7] revealed that after the sample group that had been treated, project based online with database system that based on the multiple intelligence analysis result, they acquired a higher competency. The reason of the higher competency shown is because they had the experience through collaborating, enquiring, searching, analyzing, evaluating and creating new knowledge from each unit of learning by their own selves.

Thus, the previous mentioned education innovations and limitations lead researcher to conduct a research that appends engaging project-based learning by analyzing of student's on David Kolb's learning styles in order to support and furthers the principle process of learning.

2. Objectives

1. Synthesize a framework of a Flipped Class Room by Project-Based Learning by Analyzing of Student's on David Kolb's Learning Styles.
2. To be certified by experts' evaluation on flipped classroom approach through project-based learning by analyzing of student's learning style refer to David Kolb's theory.

3. Methods

1. Conceptual framework

1.1 Originated from surveying and studying due to obstacles and literature reviews, researcher commences the FC-PjBL-Kolb's process of developing style as shown in Figure 3.

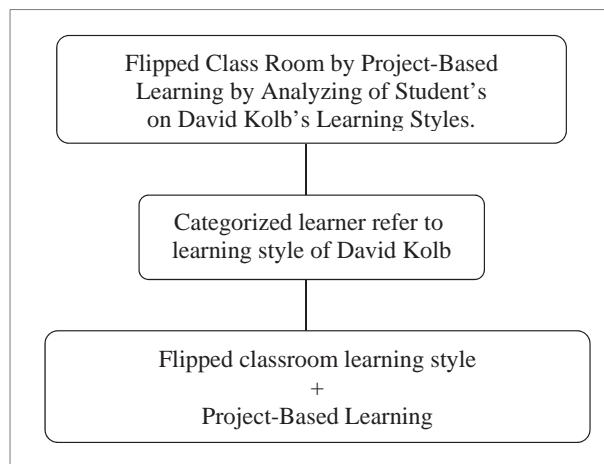


Figure 3. Conceptual framework of FC-PjBL-Kolb's

1.2 Flipped classroom management is shifting from traditional style that expanding learners experience source of knowledge by studying before educators' hand through the designed technological tools organized. Then the learning process will be conducted in the classroom by educator lead into a problem solving scenario and learners will cooperate in class and build more interaction between educators and learners which associates to flipped classroom contributes enhance

thinking skill [8]. According to shown that flipped classroom is a Mastery Learning that consists of 4elements in a systematic cycle as following Table 1 [9].

Table 1. Elements of flipped classrooms

Elements of flipped classroom	Learning activities	Responsibilities
1. Experiential Engagement	-Game -Simulation -Interaction media -Experimental -Various Art Range	
2. Concept Exploration	- Lecturing on video - Podcasts - Website - Online media chat	Educator
3. Meaning Making	- Online education board - Examination - Social media - Online discussion boards	
4. Demonstration & Application	- Conduct a project - Presentation process from conducting	Learner

1.3 Individual learning style refer to David Kolb concept following table no.2

Table 2. David Kolb learning style concept

Learning style	Learning characteristics	Individual aptitude
1. Divergers	- Brainstorm - Interested in the diversity of cultures - Prefer to work in a group - Open-minded, listen to opinions and reflections - Expertise in arts - Understand human fundamental and liberal arts	Meaning
2. Assimilators	- Able to understand the concepts of high abstract theory - Fond of thinking, analyzing, searching for results - Avoid practice as an action	Concepts
3. Convergers	- Administrable - Reviewing appropriateness before taking action - Technical preferred	Skills
4. Executive	- Adaptable and prompt to response to new scenarios - Desire to learn trial and error - Risk taker - Do not like listening to lectures	Adaptation

1.4 Project based learning style is one of the most selected outstanding styles. The researcher adapted from LAC theory in developing classroom management for the following detail; LAC theory stages are concerned on project based which is divided into 7 steps as following

- 1) Problem Discrimination Step, this is to do brainstorm and create 1 project by experiencing through their exchanging ideas and handle with other opinions.
- 2) Primary Diagnose Step that allows the peer to draft down their concept together on a pieces of paper.
- 3) Eliciting and Planning Step by flowchart and members of the team will follow the plan of each responsibilities.
- 4) Subject Research Step, learners are searching for information that links to their ability.
- 5) Drafting and Progressing Step is to comply as arranged.
- 6) Presentation Step is to display on system.
- 7) Evaluation Step by experts in this line.

2. Research Methodology

2.1 The researcher synthesized a flipped classroom with Project-Based Learning by Analyzing of Student's on David Kolb's Learning Styles as Table no.3 following phases.

Table 3. Research Methodology

Steps	Procedure	Result
1 st step Problem Discrimination Step	- Interview higher education educators regarding to classroom management obstacles. - Proceed the literature review - Learners' learning style - Education Act National Education Plan <u>2017-2036</u> - Teaching and learning styles in the 21 st century - Education innovation - Program and tools to develop - Learners' learning style survey	- Current problem of teaching and learning management - David Kolb's Learning Styles - A flipped classroom theory - Project-Based Learning theory - Result of learner's learning style
2 nd step Synthesizing conceptual framework of learners' learning style	Draft a conceptual framework refers to previous literature review; this can be framed into 3 majors. (1 A flipped classroom (2 Identify learners by David Kolb learning style and (3 Manage a project based and certify the project by experts comment.	- A flipped classroom with Project-Based Learning by Analyzing of Student's on David Kolb's Learning Styles

Steps	Procedure	Result
3 rd step Determine the relevant expert	The researcher sets up a team of 10 experts in line of Computer Doctoral degree and experience in education field for at least 3 years to evaluate the classroom management.	A group of expert at 10 then divide into; - Classroom management expert at 4 person - Education Innovation expert at 2 person - Information Technology expert at 2 person - Communication expert at 2 person
4 th step Conceptual Framework Presentation	Set up a focus group discussion	The researcher proposed the conceptual framework using the group discussion. In order to gain an advice, improve and evaluate the appropriateness of the conceptual framework.
5 th step Improve, adapt and summarize results	The researcher conducted the correction and improvement of the conceptual framework according to group discussion.	Present a conceptual framework that has been revised by experts under the consideration on evaluating the appropriateness of the conceptual framework.

4. Results and discussion

4.1. A flipped Class Room by Project-Based Learning by Analyzing of Student's on David Kolb's Learning Styles following Figure 4.

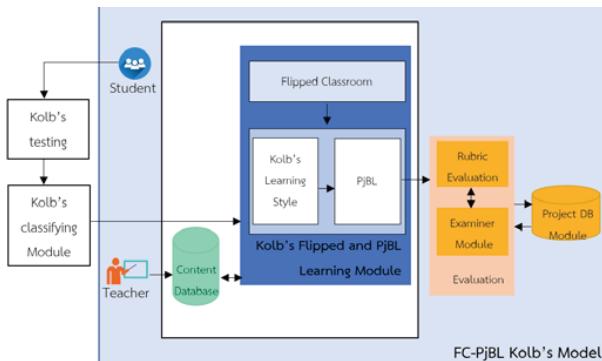


Figure 4. A flipped Class Room Management by Project-Based Learning by Analyzing of Student's on David Kolb's Learning Styles.

According to the draft of a conceptual framework of a flipped Class Room Management by Project-Based Learning by Analyzing of Student's on David Kolb's Learning Styles are Input Process and Output; there are 3 modules.

1. Input

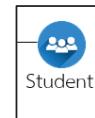


Figure 5. Student Input

1.1 Students are to act as a data collector of themselves that are

1) Students identity, students ID, name, surname, E-mail, and telephone number.

2) Data from respondents according to David Kolb's.

3) Learning data
4) Score data
which had processed

1) Learners apply to access this program as to complete general information that provided students ID, name, surname, E-mail, and telephone number.

2) Conduct Kolb's Testing in order to find the learner's learning style with 32 questions according to David Kolb.

3) Pending on the announcement of learning style of themselves and peer group.

4) Beginning of the chapter of learning style that related to their learning style.

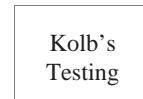


Figure 6. Kolb's Testing

1.2 Kolb's Testing consisted of 32 items as categorized below.

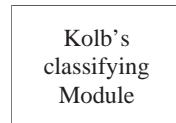


Figure 7. Kolb's classifying Module

1.3 Kolb's classifying Module is an eliciting the types of learners' learning according to David Kolb theory that had 4 types, 1) Divergers 2) Assimilators 3) Converger and 4) Executive. They operate in the module from 1) Collecting scores from questionnaires at 32 items, then calculate into average score of learnings style obtained. While some learners might have more than 1 style will acquire a consideration of lecturer that can be operated in 2 ways.



Figure 8. Teacher Input

1.4 Teacher as a manager of

- 1) setting a content
- 2) setting a pretest and posttest in between chapter
- 3) manage learners into project-based oriented
- 4) determining the topic and procedure of the work
- 5) recording learners project
- 6) reporting the score of learners
- 7) Experts management
- 8) Design an assessment design for experts.

2. Process

2.1 Online learning Module is concerning on chapters that are adding up some more content, pretest, posttest and mid-test refer to David Kolb learning style as well as to manage to project-based on PjBL foundation. All mentioned are available online.



Figure 9. Content database

2.2 Content database is an accumulation data from content by an educator focus on content appropriateness, pre-test, post-test and mid-test or an extra activity assigned.

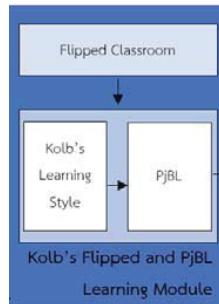


Figure 10. Kolb's Flipped and PjBL Learning Module

2.3 Kolb's Flipped and PjBL Learning Module is the part that stated that learners learning style by David Kolb theory that had 4 types,

- 1) Divergers
- 2) Assimilators
- 3) Convergers
- 4) Executive

and coordinated with project based for 7 steps. This is separated in flipped classroom is Outclass and in class compiled from 4 significant units

- 1) Enhancing tactical experience

- 2) Research on the conceptual idea
- 3) Conducting a meaningful knowledge
- 4) Demonstrating and applying

within combining to 7 processes of project based classroom management that refers to LAC concept following Table 4.

Table 4. Combining to 7 process of project based class room management refer to LAC concept

A flipped classroom management	A flipped classroom element	Project based learning style Procedure
Out class	1. Enhancing tactical experience 2. Doing researching or conceptualization 3. Creating meaningful knowledge.	1. Identify problems or issues 2. Primary diagnosis 3. Subject researching 4. Presentation 5. Evaluation
In class	4. Demonstration and application	6. Planning and determining 7. Drafting and developing

3. Output

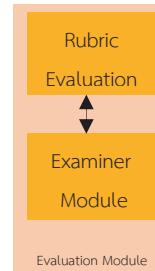


Figure 11. Evaluation Module

3.1 Evaluation Module is applied from Rubric Score by experts.



Figure 12. Rubric Evaluation

3.2 Rubric Evaluation is certified by experts' determination that found in 3 sections;

- 1) Holistic Rubric is identifying from the overall comprehend and achievement of each project.
- 2) Analytic Rubric that considered in parts of each project
- 3) Attitude Rubric for example team work, communication which are all examine in a particular sections.



Figure 13. Examiner Module

3.3 Examiner Module is an evaluation of project that obtained from online learning which evaluates from the

authentic documents and experts are scoring in revealed form to allow learners to notice.

4.2 The result of a flipped classroom by project-based learning by analyzing on David Kolb's Learning Styles had been certified by 10 experts shown in Table 5.

Table 5 The result of certifying the learning style by 10 experts.

Question items	Average	S.D.
.1Holistic of conceptual framework	4.80	0.42
2. Appropriateness of student management	4.80	0.42
3. Appropriateness of Kolb's testing in learning style partition	4.80	0.42
4. Appropriateness of Kolb's classifying Module that eliciting the learner	4.80	0.42
5. Appropriateness of Teacher / Educator that lead the classroom management	4.70	0.48
6. Appropriateness of Online learning Module that concerns on classroom management	4.80	0.42
7. Appropriateness of content database of data accumulation	4.60	0.52
8. Appropriateness of Kolb's Flipped and PjBL Learning Module that management through work based learning	4.60	0.52
9. Appropriateness of Evaluation Module that determines the project by experts	4.60	0.52
10. Appropriateness of Rubric Evaluation that concern on experts on educators' evaluation	4.50	0.53
11. Appropriateness of Examiner Module that examines project	4.50	0.53
12. Appropriateness of Project DB Module that recorded the data from learners to expert	4.70	0.48
13. Appropriateness of content management in of a flipped classroom by project-based	4.60	0.70
14. Appropriateness of learning activity refer to FC-PjBL-Kolb's	4.60	0.52
15. Appropriateness of Holistic of conceptual framework according to FC-PjBL-Kolb's	4.60	0.52
16. Appropriateness of learning style of FC-PjBL-Kolb's application	4.60	0.52
Total	4.66	0.49

According to Table 5, the result of 16 items certified by 10 experts approved at the highest level at average 4.66 and standard deviation is 0.49 and furthermore the experts suggested to improve and apply in an authentic field.

5. Conclusions

1. The researcher conducted a synthesizing flipped classroom by project-based learning by analyzing on David Kolb's learning style with an abbreviation of FC-PjBL-Kolb's that consisted of Input Process and Output. There are significant modules as following

1. Input
 - 1.1) Student
 - 1.2) Kolb's Testing
 - 1.3) Kolb's classifying Module
 - 1.4) Teacher
2. Process
 - 2.1) Online learning Module
 - 2.2) Content database
 - 2.3) Kolb's Flipped and PjBL Learning Module
3. Output
 - 3.1) Evaluation Module
 - 3.2) Rubric Evaluation
 - 3.3) Examiner Module
 - 3.4) Project DB Module

2. The result of a flipped classroom by project-based learning by analyzing on David Kolb's certified by 10 experts approved at the highest level at an average 4.66 and standard deviation is 0.49 and furthermore the experts suggested to improve and to apply in an authentic field.

Thus, the result of a flipped classroom by project-based learning by analyzing on David Kolb's learning style supports researcher to continue and enhance this finding to sample group and this will contribute a maximum benefit to teaching and learning.

References

- [1] N. Chumchuen, S. Akatimagool, M. Wangsathitwong, Professional experience teacher training based on creative thinking competency using the KWSLPA learning model, *Journal of Thai Interdisciplinary Research* 14(1) (2017) 27-34.
- [2] W. Phanit, Teacher for students to flipped class room. Bangkok: s.r.printing massproduct company (2013).
- [3] P. Phanphai, The social media utilization with the flipped classroom theory on language for communication to enhance learning achievement of orathomksa 6 students. (Master's thesis) Major Field: Educational and Communications Technology, Kasetsart University (2014).
- [4] S. Denduang, C. Rodhethbhai, Y. Keeratiburana, The creation of multimedia electronic books for Thai youth on cultural uniqueness of ASEAN countries, *Journal of Thai Interdisciplinary Research* 11(5) (2016) 41-48.
- [5] M. Tiantong, Innovation computer-based learning and teaching. Bangkok: Denex Interporation (2013).
- [6] P. Petchboonmee, D. Phonak, M. Tiantong, The forecastionof David Kolb's experiential learning style using the classification rules with decision tree technique, *Journal of Science and Technology*. 21(6) (2013) 547-557.
- [7] S. Siksen, The synthesis of an online project-based learning model with knowledge management system by analyzing of student's multiple intelligence, (Doctor of Philosophy) Major Field : Computer Education, King Mongkut's University of Technology North Bangkok (2014).
- [8] IPST. Flipped Classroom. Bangkok (2017).
- [9] W. Srihiran, Critical Thinking with flipped classroom, *Graduate Studies Journal* 13(65) (2017) 19-28