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# The Effectiveness and Suitability of MOOCs Flipped Learning: A Preliminary Study of Public Schools in Thai Rural Area

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**Abstract:** In education sector, teaching style has been adapted to the online content platform. Moreover, MOOCs (Massive Online Open Courses) and flipped learning become high potential tools to support student learning process. These e-learning tools have been designed for education leading countries based on individual students' learning style. It is quite difficult to apply for other countries. In Thailand, there are insufficient number of teachers in the rural schools and teachers have to teach a lot of subjects both experienced and inexperienced subjects. This paper proposes a new design of MOOCs hybrid learning model which is suitable and effective for rural areas students and analyse the important features to identify the factor which have influence on student ability.

**Keywords:** active learning, e-learning, flipped learning, Massive open online course (MOOCs)

## 1. Introduction

In 2015, there are several new approaches in education sector. MOOCs (Massive Online Open Courses) is an online course aim to support a large number of participants and open for accessing via the web. (Bozkurt, 2015). A new model of blended learning called flipped learning, which allows to teach from an available materials outside classroom, and then use class time for assimilating that knowledge (Berrett, 2014). All of these new e-learning tools have been established and designed for leading education countries students to support their own cultures and individual learning styles. This is the massive problem when these e-learning tools have applied to other countries (Berrett, 2014). In Thailand, there are not sufficient number of teachers in the rural schools and they have to teach a lot of subjects both experienced and inexperienced subjects. A lot of countries face with similar problem in rural area and need a new solution to solve it (Mike, 2013).

This paper expects to propose and recommend the new design of MOOCs hybrid learning model which is suitable and effective for rural area students by analyzing important features which have influence on student's ability. These answers will explore a new solution to solve the education problem not only Thailand but it can adapt to solve educational problem in rural area.

## 2. Literature review

### *2.1 Education and e-learning in Thailand*

The government allocated 460 billion baht in education spending. This constitutes 4% of GDP (TDRI, 2012). The Thai government set up a plan to become a knowledge–based society under the National Information Technology (IT) policy framework 2001–2006, or IT2010. The vision of this plan was to provide opportunities for Thais to access the Internet, use IT for lifelong learning, and improve the quality of life and the environment throughout the country, equally and efficiently. (TDRI, 2012).

### *2.2 Model of Blended and flipped learning and MOOCs*

Flipped learning approach allows students to gain first exposure to new material outside of class, usually via reading or lecture videos, and then use class time to do the harder work of assimilating that knowledge, perhaps through problem-solving, discussion, or debates (Berrett, 2012). In their free time, student go through the study materials in online content before class. In the class time, students are facilitated towards classroom discussion. Students' understanding are checked through discussion in class, group problem solving and individual test. This model can improve efficiency and educational outcome through interactive lectures and data analytics (Amirtha Mary T and J. Florence Shalini, 2015). Massive open online course (MOOCs) is an online course aimed at unlimited participation and open access via the web. It provides interactive user forums to support community interactions between students, professors, and teaching assistants (Bozkurt, 2015) MOOCs are a recent and widely researched development in distance education which was first introduced in 2008 by Stephen Downes and George Siemens and based on 'Connectivist' distribued peer learning model and emerged as a popular mode of learning in 2012 (Meltem, 2014).

### *2.3 Student-centered learning (Active learning)*

Active learning models make course concepts more meaningful, help students to explore diverse perspectives, evaluate student's assumptions to improve student communication skills and develop a better understanding of student (Barkley. F., Cross, K. P., and Major, C.H., 2005). Moreover, Just in Time Teaching (JiTT) is one of important tool of active learning. Instructors use student-performance data to understand concepts that students are struggling with and pinpoint particular students who are more at-risk. It enables instructor to maximize student participation and ask the right question to each student. It also give timely feedback and allow sufficient time to calibrate lectures (Flipped learning Field guide, 2012).

## 3. Research Methodology

### *3.1 Problem definition and research hypotheses*

The aim of this study is to propose and recommend the new design of MOOCs hybrid learning model and find the important factors which have influence on student abilities, considering chemistry learning in rural area. Flipped learning, Massive open online course (MOOCs), and Active learning are the main tools to investigate and identify the right patterns and design suitable criteria for developing countries students.

In this experiment, the results are divided to 2 sections. In the first section, the results of hypothesis H1 are provided for proving the effectiveness of learning improvement. Testing of different assumptions was conducted through pair t-test to determine the score difference between pre and post-test.

H1: There is a significant difference between pre and post-test scores

In the second section, the testing of assumptions H2-H13 are investigated to examine some relationships and influence on the learning improvement. In this section, the ANOVA test is conducted to analyze and find the influence and relationship between improvements of scores and internal factors.

H2: The GPAX will have a significant effect on score improvement

H3: Age will have a significant effect on score improvement

H4: Past e-learning experience will have a significant effect on score improvement

H5: Online quizzes will have a significant effect on score improvement

H6: In video quizzes will have a significant effect on score improvement

H7: Group quizzes will have a significant effect on score improvement

H8: Flash quizzes will have a significant effect on score improvement

H9: Discussion in forum will have a significant effect on score improvement

H10: Peer tutoring will have a significant effect on score improvement

H11: Group activity will have a significant effect on score improvement

H12: Pair activity will have a significant effect on score improvement

H13: Individual activity will have a significant effect on score improvement

### *3.2 Learning framework and instrument*

The learning framework which is used in this research is combined from Flipped learning model, Massive open online course (MOOCs), and student-centered model (active learning). This framework combines three process of activities. Firstly, teacher-centered learning, before the class content, students were tested by pre-test and collected internal factor data. After that, they learned the chemistry content from the Coursera. Popped-up video quizzes are displayed during the explanation on content. After students have learned all contents, they will be tested twice, individually by ten online quizzes and forum discussion to confirm their deep understanding. Secondly, teacher activities had been conducted. In this step, teachers used student-performance data to understand which concepts students are struggling and identified the risk group. Moreover, ten flash quiz questions were tested again before class time to evaluate remaining knowledge. Finally, student-centered learning in class activities, teacher summarized all contents for warm up session. After that, teacher divided student to groups up to their knowledge and understanding which were analyzed by Just in Time Teacher method (JiTT). Teacher taught different contents in different groups to fulfill group lacking content. Moreover, student attended the 3 active learning activities.1) individual activities, students tackle problems in the class time and have an opportunity to ask questions the instructor. 2) pair activities, students work independently and flag out their thoughts and arguments then discuss their response with a partner, and 3) group activities (fishbowl discussion), starting from small group of students sit in a circle and engage in a peer-mediated discussion then remaining students sit in a larger circle and watch the discussion, taking notes and critiquing the content and for the outer circle can then discuss the interaction (Barkley. F., Cross, K. P., and Major, C.H., 2005). After that, students were tested by group quizzes to evaluate the peer tutoring tools and individual quizzes to test their individual understanding. These quizzes were counted as post-test scores.

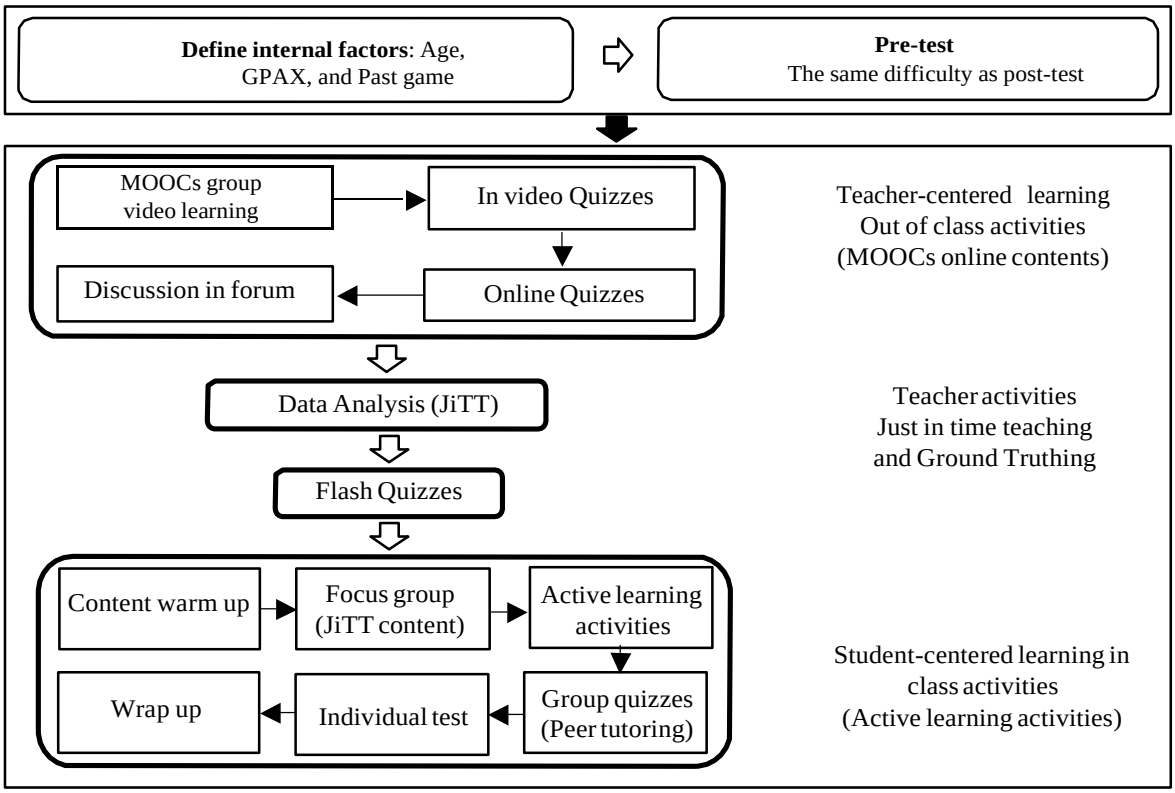


Figure 1. MOOCs hybrid learning model which is used in research

### *3.4 Data collection and sample size*

Participants are 182 randomly selected students from 3 public schools in Chaiyaphum province. Each school is a small scale school with around 300 students. The tested students are in grade 7-9 (13-15 years old). 65 students were from grade 7, 63 students from grade 8, and 54 students from grade 9. Out of the 182 respondents, 47.65% were male and 52.35% were female. The majority of students have medium (3.00-3.50) GPAX (35.71%), 34.61% have low (below 3.00) GPAX, and 29.67 % have high (3.50-4.00) GPAX.

## 4. Data analysis and finding

The results of hypothesis H1 are shown in Table 1. Testing of these assumptions was performed by the Pair t-test to determine whether the data are significantly different from each other.

The first sections, assumption H1 states that there is a significant difference between pre and post-test scores. The difference of pre and post-test scores are statistically significant at a level of 0.01(t-value = -10.56, $p<0.01$) which is accepted. It means there is a significant difference between pre and post-test scores

Table 1. The result of t-test for assumption H1

| Hypothesis | *t*-value | Test | Acceptance |
|---|---|---|---|
| H1: There is a significant difference between pre and post-test scores. | -10.56 | *t*-Test | Accepted |

In the second sections, the testing of assumption H2-H13 (see Table 2) were conducted by using the ANOVA test to analyze and find the influence and relationships between scores and internal

factors. The result of H2-H4 showed that GPAX has a significant effect on the difference of pre and post- test scores (F-value = 41.48) but age (F-value = 0.15) and past e-learning experience (F-value = 0.35) do not have an effect on the difference of pre and post- test scores. The result of H5-H8 showed that online quizzes (F-value = 4.58), group quizzes (F-value = 10.76), and flash quizzes (F-value = 9.26) have a significant effect on the difference of pre and post- test scores but in video quizzes (F-value = 2.30) do not have an effect on the difference of pre and post- test scores. The result of H9-H10 showed that discussion in forum (F-value = 8.00) and peer tutoring (F-value = 41.12) have a significant effect on the difference of pre and post-test scores. Finally, the result of H11-H13 showed that group activity (F-value = 3.115) and pair activity (F-value = 6.66) have a significant effect on the difference of pre and post- test scores but individual activity (F-value = 2.74) do not have an effect on the difference of pre and post- test scores.

Table 2. The result of t-test for assumption H2-H13

| Hypothesis | F-value | Test | Acceptance |
|---|---|---|---|
| H2: The GPAX will have a significant effect on score improvement | 41.48** | ANOVA | Accepted |
| H3: Age will have a significant effect on score improvement | 0.15 | | Rejected |
| H4: Past e-learning experience will have a significant effect on score improvement | 0.357 | | Rejected |
| H5: Online quizzes will have a significant effect on score improvement | 4.58** | | Accepted |
| H6: In video quizzes will have a significant effect on score improvement | 2.30 | | Rejected |
| H7: Group quizzes will have a significant effect on score improvement | 10.76** | | Accepted |
| H8: Flash quizzes will have a significant effect on score improvement | 9.26** | | Accepted |
| H9: Discussion in forum will have a significant effect on score improvement | 8.00** | | Accepted |
| H10: Peer tutoring will have a significant effect on score improvement | 41.122** | | Accepted |
| H11: Group activity will have a significant effect on score improvement | 3.11* | | Accepted |
| H12: Pair activity will have a significant effect on score improvement | 6.66** | | Accepted |
| H13: Individual activity will have a significant effect on score improvement | 2.74 | | Rejected |

*p<0.05, ***p<0.01*

## 5. Conclusion

Due to the main research question which covers the assumptions H1, it was found that the MOOCs hybrid learning model was effective for rural area students. Regarding to the internal factor, that have influences on the learning process. For assumptions H2-H4, they were found that age and past game experience are not effect on score improvement. This pattern can use with all age and even with students who have not had e-learning experience before. On the other hand, the academic achievement GPAX has a significant effect on score improvement. For assumptions H5-H8 in quizzes section, online, flash, and group quizzes should integrate in to learning process because they can assess and predict the learning result. Teacher should use this score for data analysis and create focus group content to fulfill the learning gap in each group. On the other hand, in video quizzes does not reflect the score and may interrupt student concentration during content learning. Next, assumptions H9-H10, discussion in forum and peer tutoring are two social elements that student can discuss and share their through and knowledge to colleague. These tools will help them to get deeper understanding in their lessons. Finally, assumptions H11-H13 were shown that students can do better if they are in group and can discuss some problem together. Moreover, social activity seem to be effective and high potential tool for students, forcing them to work together and do the peer tutoring.

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