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เรื่อง ขออนุญาตส่งบทความวิจัยเพื่อตีพิมพ์งานประชุมวิชาการ iSTEM-Ed 2021

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เนื่องด้วยกระผม ผ.ศ. ว่าที่ ร.ต. ดร. พรชัย เตชะธนเศรษฐ์ ได้จัดทำบทความวิจัย เรื่อง Teaching in a mobile programming course using Project-Based approach in Online Learning Environment

กระผมจึงขออนุญาตส่งบทความวิจัยเพื่อตีพิมพ์งานประชุมวิชาการ iSTEM-Ed 2021 ซึ่งสถาบันเทคโนโลยีจิตรลดาร่วมกับสมาคมวิชาการทางวิศวกรรมไฟฟ้า (ประเทศไทย) จัดขึ้นโดยมีรายละเอียดดังเอกสารแนบ

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Teaching in a mobile programming course using Project-Based approach in Online Learning Environment

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***Abstract*—**This paper presents teaching in a mobile programming course using project-based approach in online learning environment. The objective of this research is to examine the efficiency of teaching using project-based approach in online learning environment. The participation of the study is 15 students studying in bachelor of science in technical education. Mixed method designed were used to collected data from the students. The results from descriptive statistics and the interviewed data shown that the project-based approach in online learning environment can use to teaching in programming courses. However, teachers should prepare teaching environment before using project-based approach in online learning environment.

Keywords—teaching a mobile programing course, Project-Based approach, online learning

I. INTRODUCTION

The Ministry of Higher Education, Science, Research and Innovation, Thailand has shouted down universities during Covid 19-pandamic. This situation forced both teachers and students in teaching and learning to fully online platform since November 2020. Lecturers have changed teaching methods from classroom environment to online environment.

Even though universities trend to teaching through online learning. The successful of online learning are still controversial. In previous studies on unsuccessful course completion of online course. The study indicated that successful completion rate for students within online lecture course lower than classroom course 11% [1]. The research of Takács and Pogatsnik [2] points out that one of the biggest disadvantages of online education was experiencing isolation from peers and the lack of daily personal contact. The disadvantages caused difficulty for students to management the time to be spent on tasks independently and the time schedule.

From the controversial of teaching through online learning. This study intended to investigate the teaching using project-based approach in a programming course which requires both teaching theory and practical implication.

II. THEORETICAL FRAMEWORK

A. *Project based approach*

Problem-based approach is the organisation of learning [3] which is growing popularity in teaching. The problem-based approach can be divided into two parts: problem-solving and project-based learning. Problem-solving is known as problem-based learning (PBL). PBL are primarily focused on theoretical and methodological aspects. The authors research in PBL mostly specialised in the field of pedagogy. For project-based learning (PjBL), the PjBL are mostly using in teaching specialised disciplines such as computer engineering, technology, design. Research in the PjBL fields mostly focused on teaching specialised disciplines mentioned early for organization of project-based learning.

B. *Teaching mobile programming in online leanring environment*

There are substantial advantages in teaching in classroom, especially for teaching programming. Teaching in classroom environment allows students to discuss with both teachers and colleges. Lecturers can manage teaching environment such as classroom environment, hardware and software tools. The classroom environment assisted students to study with minimal distractions. Even though, there are substantial advantage in classroom learning. Classroom learning environments have a number of disadvantages including the need for adequate equipment and resources for effective teaching in classroom environments. The access to these resources is also limited. Traditional teaching and learning can also be inflexible for learners. classrooms are limited as they may only support a limited number of learners [4].

In covid-19 pandamic, it is necessary to teaching through online learning. Teaching through online learning is challenges for teachers to breakthrough barriers in teaching. Recently, there are substantial application that researchers can used in teaching such as YouTube, Zoom, Line application, Google Classroom and Moodle.

In this study, Google Classroom was use as a main platform in teaching [5]. Synchronous online teaching method were used. Lecturer organized lecture class and meet with student via Google meeting in each week. Asynchronous online teaching method is used. The lecture has post teaching materials in Google Classroom. In addition, Line was used as an additional communication channel to contact between lecturers and students after class [6].

C. The mobile programing course

In this section, the detail of the mobile programming course will be described as following. In the first week, two YouTube video was introduced to students. The topics is how a CPU is make and repair mobile phone. The lecturer assigned student write summary note from the repair mobile phone video. In second week, two YouTube video was introduced. The topics are the invention of mobile phones and creating mobile app using MIT App Inventor [7]. An assignment for installing MIT App Inventor was assigned to students.

In the third week, two documents were suggested to students: setting up app inventor and beginner tutorials [8]. The tutorials consisted of 4 examples in creating mobile app. An assignment for creating Mobile App was assigned to students. Students can choose one example from four examples to do an assignment. In the fourth week, a YouTube video in the topic of the develop apps with Flutter for beginners was introduced to students [9]. An assignment was assigned to students to install flutter SDK [10] and Android Studio Emulator [11]. The duration to submit this project was 2 weeks.

The fifth week is discussion week. The lecturer discussed the problem in install Flutter SDK and Android Studio Emulator. Two documents in solving installing Flutter SDK and Android Studio Emulator was provided to students. In the sixth week, the lecturer has discussed the problems in install Flutter SDK from last week. The lectures suggested a Video YouTube in teaching Dart programming language and website Dart playground that allow students in writing Dart programming [12]. This week did not have assignment to allow students learning Dart language by themselves.

The seventh week an assignment for creating project in Flutter was assign to students. Students can study the step in creating project in Flutter provided in the fourth weeks [9]. The length of video is 7 hours. The content of the media is teaching programming mobile app from installing program to writing application.

There are many programming platforms in writing application in mobile phone such as Java, flutter, Kotlin/Native. From the literature reviews, Wasilewski and Zabierowski [13] has comparison of Java, Flutter and Kotlin/Native Technologies for Sensor Data-Driven Applications. In this study, Flutter, an open-source mobile application development framework created by Google in 2017, was selected as a platform in teaching in the mobile programming course.

In assessment the successful of learning, the lecturer considers based on class attendant, handed in assignments on time, the quality of work that students submitted based on the barriers that students meet.

III. METHODOLOGY

There are 3 models of mixed-method designs: Convergence Model, Sequential Model and Instrument-Building Model [14]. The convergence model is the model in research which collects both qualitative and quantitative data then examines both data to determine the findings of a students.

A. Mixed method designed

Convergence model of mixed method designed was used in design this research. For quantitative data, descriptive statistics data collected from number of students submit assignment. For the qualitative data, the informal interviews data from students are collected. The interviews were conducted in form of discussion. The advantage of discussion instead of formal interviews is the students who participate in interview feel relax and comfortable.

B. Participant

the students who ask to participant in the study consisted of 15 students in the department of computer, faculty of industrial education, Rajamangula Rajamangala University of Technology Phra Nakhon, Bangkok, Thailand. The researcher informed the detail of research and request students to filling the permission form in participate in this study. The students consisted of 6 females and 9 males. The groups passed the 3 programming course. The first course is an introduction to programming course which teaching C programming. The second course was an apply programming course which teaching Java programming. The length of mobile programming course is 1 semester (15 weeks). This research was collected data only 7 weeks because the course is teaching while writing this paper. A reason that the researcher selected this target group in teaching using project-based approach because they have strong basic background enough in learning with project-based approach.

An important factor before learning with project-based approach students is Online Learning Readiness (OLR) of students [15]. The study of Rafique, et al. [15] pointed out that computer/internet self efficacy, online communication self-efficacy' based on respondents' gender, age and grades preparing students were noted to be strong predictors of students' OLR. The participants in this study had experienced in learning in Google Classroom platform and had basic knowledge in searching and using information for search engine websites. This students background indicated that the participants had moderate to high level OLR. The high level OLR of the participants may assisted students ready for

learning in project-based approach in online environment.

IV. RESULTS AND DISCUSSION

Data from table 1 shown the number of students handed in assignments on time, late and missing. In the first week 10 students submitted assignment on time. 3 students submitted assignment late. 2 students don't submitted assignment. Overall, it is observed that the number of students handed in assignments rate trend to lower in each week. The number of students handed in assignments late are inconsistent. While the number of students did not submit in assignments increased. From the table 1 the research investigated the barrier of students in learning through discussion and interview in each week.

TABLE I. NUMBER OF STUDENTS HANDED IN ASSIGNMENTS

Week	**Number of Students Handed in Assignments**		
	On time	***Late***	***Missing***
1	10	3	2
2	10	4	1
3	11	0	4
4	6	2	7
5	5	1	9
7	6	3	6

Table 2 show Grade Point Average (GPA) of students from semester 1 years 2018 to semester 2 years 2020. In general, the GPA is used to assess whether students meet the standards and expectations set by the degree program or university. In this research, GPA in table2 was used to compare with data from table1 to study the behavior of study while learning in this course.

TABLE II. STUDENTS CATAGORIES TO 4 GROUPS BASED ON GRADE POINT AVERAGE

Grade Point Average	***Number of Students***	***Meaning***
3.50 – 4.00	1	Excellen
3.00 - 3.49	5	Good
2.50 – 2.99	5	Fair
2.00 – 2.49	4	Poor
0 – 1.99	0	Failure
Total	15	

From Table I in week 1, the number of students submitted the assignment on time is 10 which is consistent with data from table II the number of student in Excellent, Good and Fair groups is 1+5+5 = 11.

In week 7, the number of students submitted the assignment on time is 6 which is consistent with data from table II the number of student in Excellent and Good groups is 1+5 = 6.

Assignment in week 1 is write summary note from the repair mobile phone video. Assignment in week 2 is installing MIT App Inventor was assigned to students. Assignment in week 3 is creating Mobile App was assigned to students. Assignment in week 4 is install flutter SDK and Android Studio Emulator. Assignment in week 5 is report error while install program. Assignment in week 7 is creating project in Flutter.

From the discussion with students in week 2, students who did not submit assignment in week 1 said that they don't have any problems in doing assignment. However, they still did not submit assignment 1.

In week three, Wi-Fi router is needed in connecting their mobile phone with MIT App Inventor program while student build apps. Two student reported that they did not have Wi-Fi router at home. The lecturers suggested the website of the MIT App Inventor that presents the four options in test mobile phones app with MIT App Inventor program while student build apps such as use the emulator, use USB cable and build apps with a Chromebook [16].

From the discussion with students in weeks 4, students No. 1 found a problem while the student installed android simulator software but the software was not responded. No error displayed. The researcher asked him how he solve the problem. The students told that he searched information for solve the problems using keyword in Thai language but there was no information to solve this problem. The researcher suggested the student change keyword search information form Thai to English language. There are results from search engine website show the method in fix the installation problems in websites and YouTube.

Student No.2 reported that he didn't have computer at home. He solved the problems by go to his classmate house while learning the mobile programming subject. He reported that, normally, he used mobile phone through Google meeting in learning other subjects.

Student No3. on week 6 a student absence class for 2 weeks because she infected from Covid-19. She back to attend the class on week 8.

Student No 4. reported that his hardware computer was not working. Need one weeks to fix at hardware service shop.

Student No. 5 reported that her computer very slow because, in this semester, she enrolled 7 subjects. 5 subjects were computer subjects that students required students to install software on computer.

Even though, the students had OLR because they have strong basic background enough in learning with project-based approach. These students still meet problems such as software problems while students install programs. universities had provided computers The students may solve the problem by discussing with lecturers and colleges if they study in classroom environment. For hardware problems, the university has prepared enough computers for students who enrolled in the mobile programming course. Teaching in using project-based approach in online learning environment can considered as a good method in teaching in Covid-19 pandemic but in the normal situation. Teaching in classroom environment is still the best approach for encourage in learning in the practical subjects.

V. LIMITATION

This study was conducted in only one course. This research can extend to study in other course. Only 15 of student participate in this study which is not enough in collect data to analysis. The minimum number in collect data is 30. However, this

VI. CONCLUSIONS

This paper presents teaching context of teaching a mobile programming course using Project-Based approach in online learning environment for the forth year university'students. Although the recent technology can solve the lack of education resource. For example, YouTube and online simulator

As shown in the interview, students met the difficulties in learning and doing assignment. Solving some problems assisted students learning by themselves. However, learning in classroom is the better choices because learning in classroom allows students to discuss the problems with lecturers and their colleges. Learning in the classroom creates a good learning environment that encourages students to be more interested in learning.

The result indicated that fully online learning may suitable for teaching theory. Even though, the teaching fully online course during covid-19 pandemics can facilitate teachers and students in teaching. The online learning cannot replace classroom learning. As indicated in the previous research, the findings from Gulatee, et al. [17] indicated that teaching via fully online learning may considerably as barriers to successful in learning, particularly of technical subjects.

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Since the first inception of iSTEM-Ed 2016 in Pattaya, it has moved around Thailand to Chiangmai (iSTEM-Ed 2017), Bangkok (iSTEM-Ed 2018) Nakhon Phanom (iSTEM-Ed 2019) and Phranakorn Si Ayutthaya. (iSTEM-Ed 2020)

iSTEM-Ed 2021 or the 6th International STEM Education Conference is taking place in Pattaya Chonburi, Thailand, on November 10-12, 2021.

Topics