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Teacher Professional Education Requires Mobile-based and Project-based Learning

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***Abstract*—Increased teacher competence is the focus of the current Indonesian government. Thus, there should be efforts made to support the government program. Since, in the 21st century, the achievement of competence in teachers is no longer classical but must experience a tremendous jump. The jump can be achieved by organizing learning that utilizes Information and Communication Technology (ICT). One form of ICT products is mobile learning, where learning resources can be accessed anywhere and anytime. The success of mobile learning is dependent on the selection of appropriate learning approaches. One appropriate approach for mobile learning is project-based learning. The purpose of this study is to examine the effect of learning with the approach of project-based learning and the use of mobile-learning to students' competencies, interest, and motivation. Results show that theachers' competences, interest, and motivation who receive project-based learning with mobile learning are good. This is indicated by; first, the better acceptance of ICT learning compared with learning without it, secondly, the portfolio developed by students in ICT implemented classes is better than the learning without it, thirdly, students have a high interest in ICT learning, students have good enthusiasm and activeness, and more importantly, students benefit by implementing ICT-based learning.**

Keywords— teacher professional education;mobile learning;project-based learning

I. INTRODUCTION

According to Law No.17 of 2007 on the National Long Term Development Plan (RPJMN), in this 21st century Indonesia must have qualified and competitive human resources to catch up from other countries. To achieve it, the ministry of research and higher education (KEMENRISTEKDIKTI) as the spearhead of human resource development puts it into a strategic plan, namely professional education program in Institute of Education and Education Personnel (Permenristekdikti No. 13 of 2015). This shows that there is a serious intention from the government to seek to improve the quality of human resources in Indonesia.

Part of improving the quality of human resources in Indonesia is the organization of Teacher Professional Education (PPG). To that end, starting in 2018 the government programmed this nationally by opening the PPG programs in universities in almost all provinces in Indonesia. Nevertheless, until now PPG is still looking for the right form according to RPJMN but with cost efficient. This means that the government does not have sufficient economic capacity to administer the PPG program. It's indicated by the low quota of PPG in 2018, which is only 20-thousand teachers from 500-thousand teachers who must follow the PPG and so narrow socialization PPG programs either to participants, lecturers, or organizers.

One approach to learning to achieve excellence with guaranteed quality but still efficient in teacher professional education is to utilize Information Comunication and Technology (ICT) because by utilizing ICT then human resources can provide a very big leap for the progress of the nation. The jump occurred because ICT has a myriad of benefits to achieve excellence [1].

Utilization of ICT for human capability improvement is not simple [2]. ICT devices should be purchased and should be linked. Human resource should be trained, familiarized, and integrated with the system [3]. It also requires good financing investment, which is not cheap. For that purpose, the selection and utilization of freely proven ICT systems for learning purposes is an optional part of a developing country. ICT for learning purposes is known as Learning Management System.

There are many Learning Management System (LMS) in the World [4-6]. Many of the facilities and tools that vary according to the demands of learning are offered by many LMS. The offer of powerful facilities is often offered by paid LMS. The price offered by LMS is quite high, given the consideration of their products has been through the process of testing and assessment of old and high cost. LMS with paid indeed pamper users who are not too dad to

integrate the teaching materials with contemporary devices.

Currently, there are unpaid LMS there are some who have developed, but the user must be careful and requires assessment and research to select the LMS [7]. Currently, unpaid LMS already supports mobile-learning environments [8], so LMS can now adapt to students who mostly own smartphone devices. At this time, LMS compatible with the mobile-learning environment is an inevitable requirement [9-10].

Students of professional education are adult students who tend to have high learning independence, so the chosen learning approach is andragogy [11-12]. One of the preferred learning approaches corresponding to adragogics is project-based learning. This learning approach has the advantage to increase interest and motivation to the students because the students are invited to pursue the superiority of competence [13].

The successful application of the product must measure with the acceptance of innovation [14-16]. Therefore, the application of learning should be able to measure the extent of the student's degree of recognition to the innovation. In addition, interest and motivation must also be measured because these interests and motivations can be fuel or energy to receive something [17-18]. Finally, learning competencies are a major part that must also be measured for curriculum purposes.

Based on background above, the purpose of this study is to examine the effect of project-based learning and the use of mobile-learning to students' competencies, interest, and motivation.

II. Research Method

The research method used in this research is quasi experiment. Quasi-experiment is a method commonly applied to social studies. This method has the same characteristics as the experiment but has limitations in the selection of research subjects [19]. In the experimental study, the study subjects were determined randomly, while in this study the subject of the study could not be fully controlled as in laboratory science research. For that purpose, the selection of two groups of subjects has the same characteristics or two homogeneous classes in other words the two selected students of classes do not have significantly different variations. Where there are two classes of treatment, one class uses approach to project-based learning with mobile-learning as experimental and another class is the conventional approach with mobile-learning as control. For that purpose, the research design is made like the formula below.

E : Q_1 X Q_1
K : Q_1 Y Q_2

Notes:

E: group of experimental students; K: group of control students; Q_1: pre test; Q_2: post test; X: project-based learning with mobile-learning; Y: conventional approach with mobile-learning

The subjects chosen in this study are students who projected to be a teacher (pre-service teachers). Currently, teachers who teach in Indonesia are less utilizing ICT in the process of learning and teaching in the classroom. The selection of these subjects was conducted to give them an introduction and experience for the use of a learning management system, which is expected to support government policy in improving professional teachers in the future. For that reason, the philosophy of the chosen learning approach is andragogy.

Research subjects were students at Indonesia University of Education (UPI) and Universitas of Sultan Ageng Tirtayasa. The subjects consisted of two groups, namely control and experimental class, each consisting of twenty students. Thus, the total number of students who follow the research was fourty students.

The measure of success in this study is how high interest, motivation, and portfolio of students in using the system that has been made. For the measurement of interest and motivation using Likert Scale by requesting approval for the conditions applied. Approval consists of four points, namely 1 for strongly disagree, 2 to disagree, 3 to agree, and 4 to strongly agree. Meanwhile, students' portfolio evaluation is to measure the quality of tasks undertaken by students.

III. Results And Discussion

Students of professional education enter in the categories of the generation of computer-born, for it is not difficult to teach them how to use ICT to increase competence. Those categories of ICT engagement are not a burden [1]. In addition, the Province as a place of learning test is a province that is quite ready with the application of mobile learning. For that, interest, motivation, and task products of students are important parts that need to be evaluated whether the technology can explore interest and competence in the students due to the treatment of fun or stimulating interest.

A. Results

Figure 1 shows student acceptance of the learning approach being implemented. In the experimental class, out of twenty students of fifteen students accepting applied learning, four people have not stated their acceptance yet only one refuses. In contrast to the experimental class, in the control class, out of twenty students, as many as eight students accepted the lessons being implemented, eight had not stated

their acceptance, and four expressed disagreement with the lesson. That is, the number of students who reject the learning in the control class more than in the experimental class. Thus, we can declare descriptively that project-based learning with mobile-learning learning is more acceptable than conventional approach learning with mobile-learning.

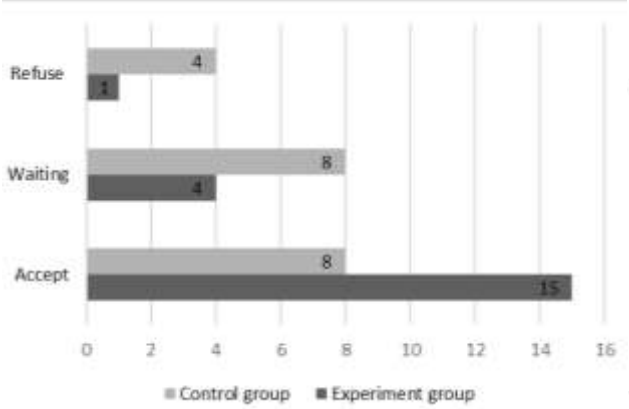

Fig. 1. Innovation acceptance and rejection

B. Competence

Student competence in this research is seen from the work of tasks given to them. The results of their work is a measure of achievement of learning objectives. Their work on the assigned task is called a portfolio. The results of the work were assessed using a likert scale, ie: 1 for bad, 2 bad, 3 for good, and 4 very good.

Based on figure 2 below, as many as ten students who received learning project-based learning with mobile-learning have a very good portfolio results, while in the class that received learning conventional approach with mobile-learning as many as five people. In addition, students who scored good in the experimental class were nine people, while the students in the control class were eight. There is one student in the experimental class who has a bad grade and none in that class has a very bad grade. This differs in the control class, where students who score bad and very bad are four and three students respectively.

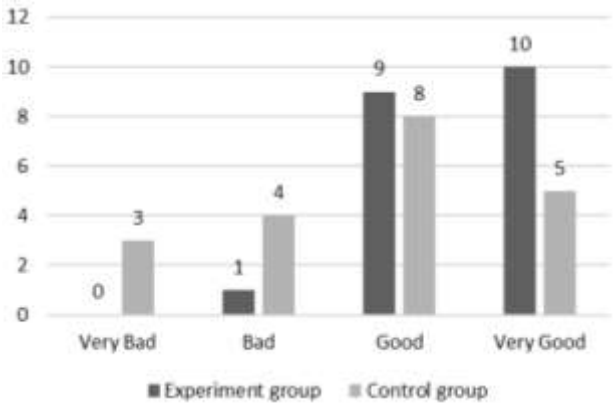

Fig. 2. Grade of Student Competency

C. Interest

To measure students' interest in learning, students in the experimental class are given the question of whether they are interested in the material given after learning. The result is shown pie chart in Figure 3.

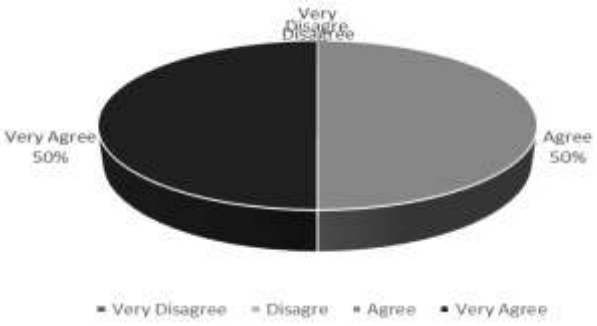

Fig. 3. Proportion of Interest on Learning

The picture above shows that 50% are interested, 50% are very interested, 0% are not interested, and 0% are not interested at all. More succinctly, the diagram above shows that 100% of students are interested and 0% are not interested.

To see student interest, in addition to student perception on learning, also monitored student attendance when learning, active in class, and readiness in accepting tasks.

From the attendance aspect, the students of the experimental class are more timely, it is shown when the lecturers enter the class, as many as 80% of students are ready, while only 20% are not ready (late to class). While the control class, when the lecturers enter the class, most students are not ready to start learning, the average readiness of students 50%, the rest are late and not enter.

From the aspect of learning activity, the students in the experimental class is better than the control class, it is seen from the students activeness in responding to the questions asked by lecturers, searching the sources of learning from the web. In addition, the quality of questions given by the experiment class students is better than the control class. Experiment class students are better prepared for the case they are experiencing by adopting learning experiences gained from other sources, while control classes tend to get stuck with lecturers' explanations. Furthermore, experimental class students are more active because they have diverse learning resources, while control classes tend to have limited learning resources. Active experimental class students work on assignments and 90% of their assigned tasks are collected on time, while control classes are less concerned with duty and only 50% of tasks are collected on time.

The last aspect to be monitored is the readiness of the students. Based on the observation, the students in the experimental class are better prepared than the control class when given the tasks. Experiment class

students feel more optimistic shown with few who filed objections in completing the task. Experiment students are not too difficult with new materials, this is different from the control class that seems to have difficulties when dealing with new problems.

D. Motivation

Motivation measurement results are shown in the diagram below which shows that 25% of students are highly motivated, 50% motivated, 20 unmotivated, and 5% unmotivated. More succinctly, the diagram (figure 4) shows that 75% of students are motivated and 25% unmotivated. Student motivation is experienced by measuring persistence, tenacity, excellence, and lecture independence. Persistence is shown by more focused experimental class students shown by the accuracy of attendance and activeness outside the class in the form of searching for learning resources outside the lecture.

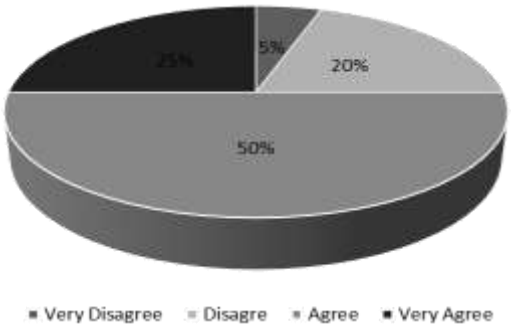

Fig. 4. Proportion of Motivation on Learning

Student experimenters better tenacity, shown by not giving up when getting difficulties. The form of effort to overcome the difficulties of the students of the experimental class is to discuss in online forums and there they share. Meanwhile, control class students tend to wait for solutions from lecturers at the next meeting.

Experimental students have a passion for excellence compared with control class students. This is shown when the lecture is that the experimental class students tend to ask more detailed and broader questions. In addition, the class of experimental students tends to produce tasks that have different power with colleagues.

Students of the experimental class have more self-reliance which is proved by not asking much about the material that has been passed, but the duties given by the selsai well. This is different from the control class. Students of the experimental class are looking for learning resources not only from lecturers but other sources from the internet.

Student motivation in experiment class is high can not be separated from readiness of student in absorbing new technology. There are some students who do not have high motivation is reasonable because the motivation associated with other variables, call it there are other motives when someone does something.

E. Discussion

There are three aspects studied in this research, namely students' competency, interest, and competency. Based on the results of research, descriptively it has been stated that project-based learning with mobile-learning is more acceptable than conventional approach learning with mobile-learning. Therefore, high acceptance of mobile-learning approaches based on projects shows that these learning are well designed to be disseminated to students so that students have great expectations for this learning approach.

Results show that the competency of the experimental class students superior to the control class. It indicate that the project-base approach combined with mobile learning has contributed significantly to the student's competence [20]. It is apparently that with project-base, teachers are given the flexibility to develop their capabilities in accordance with their capacity. Basically, teachers who are educated in professional education are have good prerequisite skills. To that end, lecturers are only in charge of directing and demanding teachers to produce great work.

The next aspect is interest. Result shows that teachers of professional education choose to agree 100% over the learning approach indicates that they do not feel patronized. After the teacher is given an explanation that can be accessed by mobile and can be repeated wherever and whenever. The teacher has clarity on what to do, so when they are given the assignment then there they are self-executing. It also shows that learning approaches are in accordance with expectations and according to the scheme they have because interest is closely related to their previous abilities [21-22] and project-base promises hope for their competence [13]. Learning using project-base with mobile learning gives comfort, enthusiasm, and benefit. Comfort is indicated by the attendance of the students in the class on time, enthusiasm is indicated by the activity of the students when discussing and better at listening to the lectures, while the benefits are well indicated readiness of students in doing the task.

The last is motivation. In general, teachers are motivated over the learning approaches that have been made. Anything about 25% that is not motivated is understandable because in the process of dissemination of innovation there are still groups who refuse and wait [14]. However, if such an approach is consistently applied, there will be incursions that may decrease the rate of rejection.

IV. CONCLUSION

Based on the discussion of the results and discussion can be stated that in general, learning with project-based learning using mobile learning has a positive influence on the competence, interest, and motivation of prospective teachers. It is indicated by several aspects, there are; acceptance of project-based learning with mobile learning in this study is good; competence of professional education students facilitated by mobile learning with project-base approach is better than the students who facilitated mobile learning only; student interest in the experimental class achieves the expected competence. This is evidenced by, students feel more comfortable, enthusiastic, focused, active, and feelings of meaningful lectures, look better. Similarly, student motivation is very high, evidenced by perseverance, tenacity, excellence, and independence of lectures. Student lecture product is very good, proved by the tasks produced by students after the recovery.

V. RECOMMENDATION

Lectures with the Mobile-based and Project-based Learning approach can be applied to lectures by students with professional education skills. However, lecture support devices should be prepared in the form of hardware, software, readiness of lecturers, readiness of students, and network readiness. Rather, the next study needs to be done is how the consistency of the work of teachers after the preliminary of professional education.

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REFERENCES

[1] A. Hasani and A. Hendrayana. “Use of Social Media for Final Writing Guidance in Higher Education”. *Adv. Sci. Letters*, pp. 2678-2681, 2018.

[2] K. A. Bingimlas. “Barriers to the successful integration of ICT in teaching and learning environments: A review of the literature”, Eura J. of Math., Sci. and Technol. Edu., vol. 5, n. 3, 2009.

[3] S. Hidayat, A. Hendrayana and H. Pujiastuti. "Identification of Readiness of Developing University to Apply Information and Communication Technology (ICT) in Teaching and Learning". SHS Web of Conferences 42, 00117. https://doi.org/10.1051/shsconf/20184200117.2018

[4] A. Reshad. “Learning Management Systems”. The TESOL Encyclopedia of English Language Teaching, 1-5, 2008.

[5] C. Dalsgaard. “Social software: E-learning beyond learning management systems”, Europ. J. of Open, Dista. and E-Learn., vol. 9, n. 2, 2006.

[6] B. Beatty and C. Ulasewicz. “Faculty perspectives on moving from Blackboard to the Moodle learning management system”, Tech Trends, vol. 50, n. 4, pp. 36-45, 2006.

[7] E. Sonmez and M. Koc. “Pre-Service Teachers' Lived Experiences with Taking Courses through Learning Management Systems: A Qualitative Study”, Turk. Onl. J. of Dista Edu., vo.. 19, n. 2, pp. 101-116, 2018.

[8] Y. Park. “A pedagogical framework for mobile learning: Categorizing educational applications of mobile technologies into four types”, The Inter. Rev. of Res. in Open and Distr. Learn., vol. 12, n. 2, pp. 78-102, 2011.

[9] F. N. Al-Fahad. “Students' attitudes and perceptions towards the effectiveness of mobile learning in King Saud University, Saudi Arabia”. Online Submission, vol. 8, n. 2, 2009.

[10] A. Hendrayana and Wahyudin. "Mobile learning to improve mathematics teachers mathematical competencies". IOP Conf. Series: Journal of Physics: Conf. Series 948, 2018, 012049 doi:10.1088/1742-6596/948/1/012049

[11] S. B. Merriam. “Andragogy and self-directed learning: Pillars of adult learning theory”. New directions for adult and continuing education, vol. 89, pp. 3-14, 2001.

[12] M. Knowles and M. Smith, M. Adult Learning Theory (Andragogy). Web adresi: https://sites. google. com/a/nau. edu/educationallearningtheories/adult-learningtheory-andragogy-by-barbara-miroballi (Erişim tarihi: 20.04. 2016), 2002.

[13] A. Hasani, A. Hendrayana and A. Senjaya. “Using Project-based Learning in Writing an Educational Article: An Experience Report”, *Univ. J. of Educ. Res.*, vol. 5, n. 6, pp. 960 - 964, 2017.

[14] E. M. Rogers and M. Everett. Diffusion of Innovations , 3rd ed. New York: The Free Press. 1983. pp. 138-139.

[15] C. Gautreau. “Motivational factors affecting the integration of a learning management system by faculty”. J. of Educa. Onl., vol. 8, n. 1, 2011.

[16] P. Y. Chau and P.J. Hu. “Information technology acceptance by individual professionals: A model comparison approach”, Decision Sci., vol. 32, n. 4, pp. 699-719, 2001.

[17] H. Coates, R. James and G. Baldwin. “A critical examination of the effects of learning management systems on university teaching and learning”, Tert. Edu. and manag., vol. 11, pp. 19-36, 2005.

[18] H. Singh. “Building effective blended learning programs”, Educ. Technol., vol. 43, n. 6, pp. 51-54, 2003.

[19] J. R. Fraenkel, N.E. Wallen and H.H. Hyun. How to design and evaluate research in education, Vol. 8, New York: McGraw-Hill, 2012.

[20] A. Mutaqin, I. Marethi and Syamsuri. "Model blended learning di Program Studi Pendidikan Matematika Untirta". Cak. Pend., vol. 1, n. XXXV, 2016.

[21] S. Tobias. “Interest, prior knowledge, and learning”, Rev. Educ. Res., vol. 64, pp. 37 – 54, 1994.

[22] A. Hendrayana. “Pengaruh pembelajaran pendekatan rigorous mathematical thinking (RMT) terhadap pemahaman konseptual matematis siswa SMP:, Jur. Riset Pend. Mat., vol. 4, n. 2, pp. 186-199, 2017.