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Maximize the mobile learning interaction through project-based learning activities

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Mobile learning implementation at school is a must and meets what students currently need. To facilitate those conditions, teachers also need to have competencies in managing online learning. This research is a descriptive research to find out the experience of students who are prospective teachers when attending the mobile learning course supporting Moodle open source application on the topic of 'designing online learning'. Constructivist On-Line Learning Environment Survey (COLLES) questionnaire which is installed on learning management system was used to find out the learning experience. This poll includes six aspects which are relevance level, the reflective level for students, student interactivity level, tutor support level, peer support level and communication level of student and tutor (interpretation). Each aspect consists of 4 items, so there are 24 items in total. Learning strategy used is project-based learning. The final product is online learning design for physics. Analyzing data from the questionnaire, the highest score is relevance (86.54%), followed by peer support (83.65%), tutor support (78.85%), reflective thinking (73.08%), interpretation (70.19%), and the lowest one is interactivity (69.23%). This result shows that altogether students experience positive learning through online learning.

Key words: Teacher training, e-learning, mobile learning, learning management system, physics education, project-based learning.

INTRODUCTION

The mobile learning is a consequence of the development of information and communication technology. Nowadays, educational institutions at various levels have taken advantage of the multiple benefits of it to improve learning performance (Sung et al., 2016; Sulisworo and Toifur, 2016).

In mobile learning, students are able to arrange many learning activities for instance, watching an online lecture, collaborate in online discussions, and engage in their learning facilitated by the teacher (Spring et al., 2016; Newhouse, 2015). Also, teachers can intensify further the interaction between students with students and teachers with students for the process of sharing information efficiently. Through online activities, students are also

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more confident to be able to convey ideas and opinions during the learning process (Scherer et al., 2015; Sulisworo et al., 2017b).

The development of the current generation that tends to be more comfortable with online learning interaction becomes one of the driving factors in the school management. The tendency that students have taken advantage of mobile technology in the form of smartphones in everyday life, making efforts for their use in learning is quite important (Alharbi and Drew, 2014; Hwang and Tsai, 2011).

Teachers should have this ability and skill to be able to arrange their classroom. This phenomenon needs to be anticipated by higher education institutions which provide teacher education and training in their curriculum (Darojat, 2016; Dochy et al., 2014; Fu, 2013). Prospective teachers need to be prepared to be able to face future students who are very likely to have different learning characteristics with current students. Thus, preparing teachers who can manage future learning is essential, so they will be able to achieve the expected learning performance (Dhaheri and Ezziane, 2015; Barber et al., 2015; Gu et al., 2013). The mobile learning gives many opportunities in teaching students by using their mobile technology at school.

One of the learning strategies that enable students to face the real situation (Abke et al., 2014; Biasutti and El-Deghaidy, 2015; Dochy et al., 2014) is project-based learning that enables students directly meet the practical problems associated with e-learning (Alharbi and Drew, 2014). Project-based learning promotes self-regulated learning (Bagheri et al., 2013; English and Kitsantas, 2013) in online mode (Issa et al., 2014; Lai and Hwang, 2014).

As prospective teachers, they will manage learning management in the future. Through this teaching, prospective teachers design e-learning with specific criteria. The final result of this learning process is the design of learning on particular materials that utilize the various features that exist in the learning management system (LMS) to build a good learning interaction. The lesson plans created with the LMS include learning preparation activities, learning processes, and learning evaluations.

By using project-based learning, prospective teachers will have experience how to design knowledge and experience how to engage in online learning. Teacher belief on using some technologies will affect their teaching and learning practice (Cheung and Vogel, 2013; Sulisworo et al., 2017b). Taking into account the background, the purpose of this study is to explain how prospective teachers' views relate to their experience of online learning or e-learning and their designing of e-learning.

METHODOLOGY

Mobile learning gives new chances in building learning interaction among students. Also, it is also more comfortable for students because it suits their habit of using mobile technology in daily life. Especially in Indonesia, the regulation has not allowed full e-learning. Classroom activities which are teacher meet face-to-face with the student are mandatory.

However, school management has been promoting the mobile technology used in the classroom. Researchers conducted this study at a private university in Yogyakarta, Indonesia, from January to May 2017 during the lecture of learning management system (LMS) course. The course participants were 27 students of prospective science teachers taking LMS course consisting of 11 males and 15 females.

Students, who are prospective teachers, took this subject to be able to design internet-based learning when graduating. This issue was two credits point with 100 minutes per week for 14 weeks. The result of this subject was a ready-to-use learning design made in groups. The basic standard of learning had been determined to ensure that the learning design can meet the need.

This mobile learning used LMS for maintaining student interactions and also as a tool for the student to design their lesson plan as a project product. The project progress was presented every week in the classroom. The teacher conducted the learning process using Moodle (Modular Object-Oriented Dynamic Learning Environment) based on LMS. The teacher provided the weekly course for the learning interaction. The learning process was conducted with design as follows:

(1) All students became the members of LMS course. This course was used to share information, discussion and other interactions designed by the lecturer.
(2) Teacher divided students into three groups consisting of 3 or 4 members each. Each team had a project to design online learning. Teacher gave a role as a teacher in his/her group for each student.
(3) Each student became a participant of other groups' learning design. As participants of a group's project, they had to participate in any activities provided. Therefore, they could feel whether the learning interaction developed was right or not.
(4) Each group reported the progress of the group's project periodically through the activity prepared by the lecturer. The lecturer played a role in managing communication traffic of all students to make sure that all teams can achieve the goals. These activities were conducted every week in the classroom.

This study used a descriptive analysis using Constructivist On-Line Learning Environment Survey (COLLES) questionnaire. COLLES is a survey which is packed with Moodle courseware and is designed to assist the assessment of the critical questions on the quality of online learning environment. The format of the questionnaire requires the respondents to show the agreement or disagreement level by using a Likert scale of 5 points (1-almost never, 2-seldom, 3-sometimes, 4-often, 5-almost always). This questionnaire includes six learning aspects which are relevance level, the reflective level for students, student interaction level, tutor support level, peer support level and communication level of student and tutor (interpretation) (Taylor and Maor, 2000; Zafar et al., 2014).

RESULTS

Data of the frequency of the students' answers on COLLES instrument was used as the basis of the analysis. The recapitulation of these data which is the sum of the question item frequency for each aspect can be figured out by Table 1. Figure 1 shows the perception of the student of LMS course related to their online learning experience with project activity they conducted.

Table 1. Frequency and percentage of learning experience on each aspect.

Aspects	Almost never	Seldom	Sometimes	Often	Almost always
Relevance: the course's relevance to student's interests and professional goals	2 1.92%	1 0.96%	11 10.58%	73 70.19%	17 16.35%
Reflective thinking: the level of critical or reflective thought that the student applies to the material of the course	0 0.00%	0 0.00%	28 26.92%	60 57.69%	16 15.38%
Interactivity: the level of interactivity the student engages in during the course	0 0.00%	1 0.96%	31 29.81%	63 60.58%	9 8.65%
Tutor support: the level of tutor support	0 0.00%	0 0.00%	22 21.15%	58 55.77%	24 23.08%
Peer support: the student is receiving peer supporting the course	0 0.00%	0 0.00%	17 16.35%	76 73.08%	11 10.58%
Interpretation: the success of both students and tutor in making good sense of each other's communication	0 0.00%	0 0.00%	31 29.81%	54 51.92%	19 18.27%

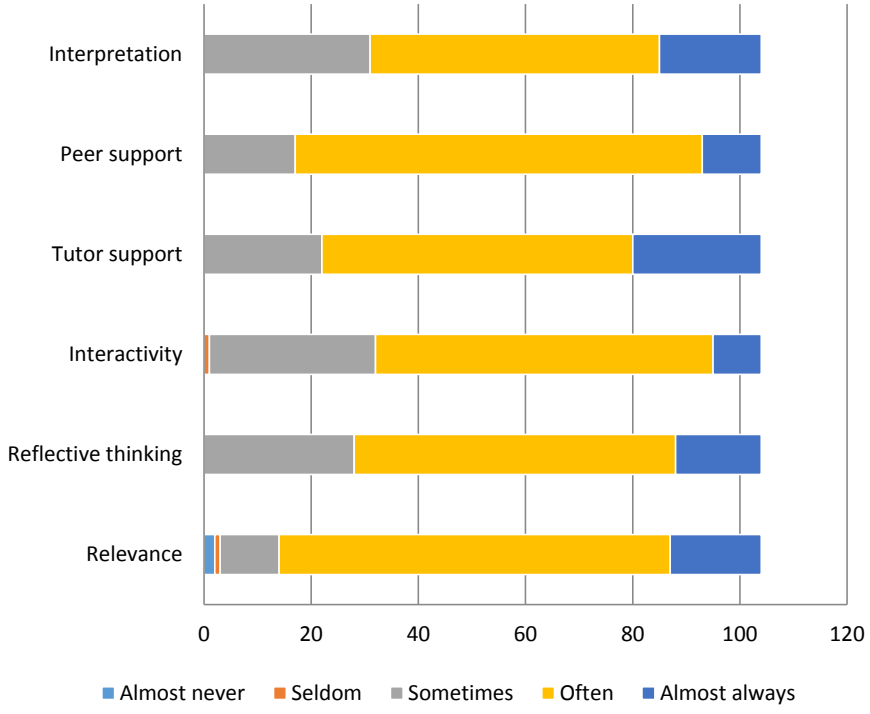

Figure 1. The comparison of learning experience perception for each aspect.

On each aspect (relevance, reflective thinking, student interactivity, tutor support, peer support and interpretation), there are four questions, so there are 24 items in total. For further analysis, Figure 1 represent the data of Table 1 in another form. The agreement level of the positive result on learning experience was obtained

by summing the frequency of often and almost always. Figure 1 shows the data calculation result. From Figure 1 it can be seen that the highest score is on relevance aspect (86.54%) measuring the relevance level of learning activities with the student's interests and professional goals. The next score is peer support (83.65%), tutor support (78.85%). Then, reflective thinking (73.08%) measures the level of critical or reflective thought that the student applies to the material of the course, interpretation (70.19%) measures the success of both students and tutor in making good sense of each other's communication. The lowest score is interactivity (69.23%) measuring the level of interactivity the student engages in during the course.

DISCUSSION

The perception of the learning experience on relevance aspect that got the highest score becomes a hope that online learning is relevant to student's interests and professional practice that they will overcome as prospective teachers (Gu et al., 2013; Han et al., 2015). The tendency that students are digital native makes them comfortable with the learning. The learning content which directly relates to the learning process itself shows that students have good interest in online education (Izmirli and Izmirli, 2015; Lai and Hwang, 2014; Ravitz and Blazevski, 2014).

The students learned how to design online learning by attending online education and during the discussion in the classroom while presenting their project progress. This combining activity affected the student motivation to involve in learning (Fernandes et al., 2014; Han et al., 2015; Issa et al., 2014). Learning by doing in the project-based learning makes it possible that the teaching is relevant to their interests and professional practices (Biastuti and El-Deghaidy, 2015; Abke et al., 2014; Spoelstra et al., 2014). Researchers convey the discussion on each aspect from the highest to the lowest score of learning experience perception.

Peer support during the online learning happens when students from other groups criticize the product made by the team. In addition, in education, students are expected to use positive words when discussing in the forum or chatting. Teacher conducts project-based learning openly. Therefore, every group could observe each other's work progress that further enables the various suggestions on the product. Practicing to use positive words also makes all students feel good peer support. Facilitating useful behavior during learning activities will increase the learning performance (Stolk and Harari, 2014; Sulisworo et al., 2017a) during mobile learning activities.

The aspect of tutor support was related to how the lecturer played a role to support the success of student learning. Constructivism through project-based learning made the lecturer role, not as the center of learning. Students became the center of learning that managed their success on knowledge. The purpose of the lecturer on education is to ensure all groups could lead and successfully finish the project (Leybourne and Kennedy, 2015; Ravitz and Blazevski, 2014). To get information and understand the learning activities deeply, the lecturer only directed the students to search for online learning sources and indirectly gave learning materials or information needed.

The aspect of reflective thinking measured the level of critical or reflective thought that the student applies to the material of the course. The critical thinking skill can develop when one faces an ill-defined problem. In the conducted learning process, students can complete their project openly. All groups might have different strategies to achieve the result. Also, other groups' critics in the progress report session enabled all teams to do reflection on what they were doing to finish their project. These repetitive activities of reflection allow students to have good experience on the aspect of reflective thinking (Barber et al., 2015; Chen and Chang, 2014).

The aspect of interpretation measured the success of both students and tutor in making good sense of each other's communication. The role of the lecturer in directing learning activity so that all groups could finish the task influenced the student's psychological pressure. The product in the form of learning design in a particular standard became the factor that influenced the communication level of lecturer and students. The learning achievement can also be seen on the level of learning experience perception on the aspect of tutor support. Students gave the low response to the role of the lecturer on arranging the student-centered learning shown by the level of the interaction between lecturer and students (Dochy et al., 2014; Khawaja and Qureshi, 2016).

The aspect of interactivity measured the level of interactivity the student engages in during the course. The student habit which prefers to not express ideas except if externally stimulated resulted in posting on the forum and chatting which was not high enough. From the posting activity pattern, it can be seen that students responded to the discussion if the lecturer asked. This trend impacted on the tendency of interaction among students that became less maximal. This communication can also be seen from the number of students who asked other students to deliver ideas which were rare. There was a tendency that students only responded to what the lecturer proposed, but respond less to what other students asked. The intensity level of student activities to post their idea is an aspect of the online learning success (Sulisworo et al., 2016).

From each aspect analysis explained, it can be seen that in whole project-based learning conducted gives chances for optimum learning interaction. The factor that may become an obstacle in online learning is that student

experience what they experienced is a teacher-centered learning, seldom faced the ill-defined problem and rarely involved in collaborative learning (Leybourne and Kennedy, 2015).

The learning evaluation approach also affected the student during learning (Valtonen et al., 2015; Ravitz and Blazevski, 2014; Ursavas et al., 2015). By implementing online project-based learning, it enables the students to get a learning experience that meets what current era demands which support the development of 4C skills which are critical thinking, communication and collaboration (Dhaheri and Ezziane, 2015; Fernandes et al., 2014; Hwang and Tsai, 2011).

Conclusion

The learning experience through online learning with project-based learning received a keen perception from the students on six aspects which are relevance, reflective thinking, interactivity, tutor support, peer support, and interpretation. The orientation on strengthening critical thinking, communication, creativity, and collaboration could be facilitated well through online project-based learning. This result becomes an optimistic hope for the learning implementation when they become teachers of students who are comfortable with online virtual activities. How to create a warmer interaction among students without being trapped on only fulfilling the learning demands is needed.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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