

Edmodo as Media to Support the Plumbing Theory Courses in Vocational Education Learning

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Abstract. The purpose of the study was to determine the effectiveness of edmodos e-learning as supporting learning in the Plumbing Theory course in Vocational Education of Building Construction students. The research was conducted as the application of blended learning that carried out in an integrated manner at the Faculty of Engineering in 2019. The research method used the Quasy Experiment Method. Data collection techniques used were using multiple choice tests and questionnaires. The results of the research showed that Edmodo has been proven effective improve student learning outcomes of participants in the Plumbing Theory course. The post test results showed a significant increase after students were given treatment in the form of Edmodo utilization compared to the pre-test results that had not been given treatment. Edmodo has been proven to increase the learning motivation of students in the plumbing theory course. Edmodo has an advantage in its ease of access. Students participating in the Plumbing Theory courses access Edmodo with high intensity because it utilizes Edmodo in learning. The biggest obstacle experienced by students in accessing Edmodo is the internet network that does not support.

Keywords: Edmodo, plumbing course, vocational education

INTRODUCTION

The Plumbing Theory and Practice course is given to undergraduate students of Vocational Education of Building Construction (VEBC) in sixth semester. This course consists of learning theory and practice collaborated with 3 credits. In fact, the material in this course is very large because in addition to focusing on plumbing design and technology, this material is required to accommodate Building Utility Systems subjects that will be taught in Vocational High School (VHS) with care competency Building Construction, and Sanitation. The material in these subjects is also very large because it includes mechanical, electrical, and plumbing (MEP).

For comparison, in Department of Civil Engineering and Planning, Yogyakarta State University, there were four courses related to plumbing, namely: utility courses 2 credits, plumbing I practice 2 credits, plumbing II practice 2 credits, and plumbing practice and sanitation 2 credits. They are related to plumbing have 8 credits so it is very far if compared with VEBC Jakarta State University which is only 3 credits. Plumbing is a small aspect of building costs but when viewed from its usefulness, a building cannot operate without a plumbing system.

Teaching about plumbing was first enforced in 1886. This was explained by Swash (1957) that in 1883 a discussion was held by the Congress of the Medical Association held in Liverpool. The results of the discussion agreed that the piping network could only be installed by competent craftsmen craftsmen. The following year, the meeting was held in London, with more extensive discussion by inviting architects, sanitation engineers, and plumbers. This recommendation and agreement were only implemented in 1886 by a pipe company that established a certification body for plumbers in the UK.

Teaching about plumbing now is not only given to employee but also given to civil engineering students at various universities. This is a provision for students in the construction world later. Lensjø (2020) stated that as experts, the plumbers often solve problems more functional and cost effective than suggested in the blueprint. Therefore, the Plumbing Theory course is essential. Teaching and learning activities in the classroom have become the main activities of the lecture. But based on the Minister of

Higher Education Regulation Number 044 of 2015 about National Standards for Higher Education, 1 Credit consists of (1) Face to face 50 minutes/week/semester; (2) Structured tasks 60 minutes/week/semester; and (3) Independent activities 60 minutes/week/semester. This means that face-to-face teaching and learning activities are part of the lecture, in addition to structured tasks and independent activities. The 150-minute lectures are underutilized by students to study more in the material taught. Pedagogical competencies of teacher candidates must be mastered and developed before being applied to vocational schools (Rabiman et al., 2020).

Entering the era of industrial revolution 4.0, educators are required to utilize technology as an interesting learning medium for their students. No exception for lecturers, students who are now taught are millennial generations who from high schools are familiar with the internet. Internet technology is like a double-edged knife, on the one hand it can be utilized on positive things but on the other hand damage and crime are manifested on the internet. Constraints for educators in implementing innovative learning are the lack of examples, guidance, and training in implementing innovative learning models. One of the efforts to overcome this problem was utilizing ICT, namely by providing a remote assistance application (Koesnandar, 2020). Use of ICT in the form of practical equipment, multimedia, and blended learning models has great potential in achieving higher-order thinking Skills vocational students (Sukatiman et al., 2020). One of the uses of the internet as a learning media is Edmodo e-learning. Like other social networks, Edmodo accounts can be obtained without pay and Edmodo is designed for learning and school-based use. Some features that are commonly found in Learning Management Systems (LMS) to support e-learning such as assignments, quizzes and assessments are also available in Edmodo. Edmodo was selected since it is called 'Facebook for Schools', which has a growing popularity worldwide with its easy-to-use social-network style. Edmodo helped learners to build social presence online via on-line learning tasks (Ateş Çobanoğlu, 2018). Edmodo is quite complete as an LMS with faster access and easier use with some features that function just like other LMS like Moodle. These advantages make Edmodo very potential to be used to help students overcome the above problems.

Teaching materials using Edmodo have an effect but not too significant on student learning achievement. This is in accordance with the results of research conducted by (Hankins, 2015). This is because students do not use technology as a learning medium to interact with each other, to anticipate this, students need to be taught to operate it. Edmodo is a good supplement because it allows students to improve learning through active participation in online discussions and assignments (Enriquez, 2014) and (Nasrullah et al., 2018). The results of Enriquez's research state that Edmodo is an extraordinary and very simple learning platform so that observations and data on student acceptance and responses show a high level. Furthermore, the majority of participants agreed that Edmodo is a good learning tool to complete face-to-face discussions and collaboration platforms that are good for students and teachers. However, there are also some disadvantages to using Edmodo, such as time consuming, difficulty in following, procedures, plagiarism towards assignments, and not all students have internet access.

Furthermore, Alshawi and Alhomoud (2016) and Hoerunnisa et al. (2019) concluded that Edmodo can increase motivation and interaction between lecturers and students. Through Edmodo lecturers can integrate education networks to create effective online learning classes for their students. Putra et al. (2018) states that Edmodo is proved to be effective in improving the Vocational Student's management project in the disruptive era of technology. Therefore, the researchers tried to utilize Edmodo as an e-learning in the Plumbing Theory course. Associated with the current conditions, Chaeruman (2020) stated that the Covid-19 pandemic has made us realize how important it is to combine and optimize in such a way that these synchronous and asynchronous learning spaces are suitable.

METHODS

In this study using quantitative research with a quasi-experimental method. This research design "One-Shot Case Study". namely by design there is a group given treatment, and then the results are observed. Data collection is done by using tests and questionnaires. Test is used to obtain data on student results. While the questionnaire was used to get students' responses related to implementation Edmodo in Learning process.

The utilization of Edmodo e-learning to support student learning outcomes in the Plumbing Theory course is given to classes A which amount to 80 students. The data processed in the effectiveness testing of edmodo's e-learning took the form of cognitive tests, namely the pre-test and post-test and the results of the student questionnaire. Testing the instrument in this study using the test of validity, reliability, differentiation, and level of difficulty. Next, do the test using Normalized-Gain Test. The study was conducted on 4 - 11 October 2018 in the VEBC study program in Universitas Negeri Jakarta (UNJ).

This study uses the N-Gain test to find out or provide a general description of the increase in the score of learning outcomes between before and after the application of Edmodo. Based on these definitions, the N-Gain test is considered appropriate to determine whether there is a student's development. The N-Gain Test can use the formula below.

$$\text{Normalized gain } (g) = \frac{\text{Posttest Score} - \text{Pretest Score}}{\text{Maximum Score} - \text{Pretest Score}} \dots\dots\dots (1)$$

While for the category can be seen in the table 1.

Table 1. N-Gain Test Results Categories

Normalized Gain Score	Interpretation
$-1,00 < g < 0,00$	Decrease
$g = 0,00$	Stable
$0,00 < g < 0,30$	Low
$0,30 < g < 0,70$	Average
$0,70 < g < 1,00$	High

The analysis used to process questionnaire data is using descriptive analysis. Percentage is used to display quantitative data (numbers) into sentences. The questionnaire of this study has 11 positive statements and 2 negative statements. As for positive statements, alternative answers "Strongly Agree" score 4, "Agree" score 3, "Disagree" score 2, and "Strongly Disagree" score 1. Whereas the negative statement is the opposite. The purpose of using the questionnaire in this study was to determine the response of students after using edmodo media in the subject of Plumbing Theory.

Before the question is given to the experimental class, the instrument test is done first in the form of validity, reliability, differentiation, and level of difficulty. The function of research instrument testing is carried out with the aim that the instruments used in this study have good, reliable validity questions or the results are fixed if the instrument is tested at any time, has different power that can distinguish students who are low, medium, and high and have difficulty levels well.

From the results of the calculation of the validity test, it was found that from 50 multiple choice questions found 25 valid questions. The reliability test results obtained Cronbach alpha value 0.745. This value is included in the high reliability category. Whereas for the questionnaire's reliable value obtained a value of 0.794 which is included in the high reliability category.

RESULTS AND DISCUSSIONS

In the Plumbing Theory Course, Edmodo e-learning is used as communication media between lecturers and students. Students who have difficulty in understanding lecture material can ask the lecturer, either through messages or ask in the comments' column. In addition, Edmodo is used by lecturers to share lecture material files, remind assignments, and other important announcements. This is more effective because the message the lecturer delivers can be read by all students. E-Learning media using Edmodo is interesting, efficient and effective. The improvement of students' learning outcomes is triggered by the ease of operating the media (Tuna et al., 2018).

Edmodo is used as an internal media give a quiz. Quizzes can be given in the form of multiple choice, entries, or essays. On the implementation, quiz in the form of multiple choice which is often applied because it is more valid during the automated assessment process. Some of the conveniences in applying quizzes on edmodo, namely: (1) Quiz time can be determined so that students who are late can identified; (2) the posting time can be determined so that the post will appear automatically according to the time set; (3) the quiz score will be automatically captured after the student finished working on the quiz; and (4) percentage of quiz participants who answer right or wrong questions will be known immediately after the quiz time is over.

Edmodo is also used as a reminder and collector of assignments for students. Assignments are collected in soft file format and uploaded into the assignment section that has been posted by lecturer. The advantage of this method is students who do not collect assignments can be known immediately. This psychologically affects students so that they are encouraged to immediately collect the assignments.

The data processed in this study is the value of the learning outcomes of VEBC students who take the Plumbing theory course. The learning outcomes are used the results of the pre-test and post-test scores. The pre-test problem is given with the aim of knowing students' abilities cognitively before being given treatment. Implementation of blended learning with Edmodo can improve student learning outcomes in the cognitive aspects (Sugiarti et al., 2018). The lecturer gave lectures in class without utilizing Edmodo in the learning process. Students hear and some record explanations from lecturers. Furthermore, in the next meeting, the lecturer uses Edmodo by distributing lecture material before the lecture takes place. After the material was explained, the lecturer gave a post-test question. Post-test questions are given in order to compare the presence or absence of an increase in the value of student learning outcomes before being given treatment with the value of student learning outcomes after being given treatment. Edmodo is becoming increasingly used in higher education. It helps teachers to easily share learning content with students, and communicate with them better. Use of Edmodo within the pedagogy of integration enhances both learning and teaching experiences (Ryane & El Faddouli, 2020). Below is the result of the analysis of the pre-test and post-test values.

Table 2. Output of Pre-test and Post-test Value Analysis

		Statistics	
		Nilai Pre-test	Nilai Post-test
N	Valid	80	
	Missing	0	80
Mean		58.63	0
Median		60.00	87.9500
Mode		60 ³	92.0000
Std. Deviation		11.747	96.00
Minimum		22	15.04079
Maximum		78	44
a. Multiple modes exist. The smallest value is shown			

Based on the Table 2, there can be seen that the average pre-test score is 58.63 with the lowest value of 22 and the highest score of 78. After the pre-test is done, the researcher uses Edmodo to provide lecture materials so that students can learn. At the next meeting, the lecturer explained the material that had been distributed in Edmodo and then carried out post-test. The post-test given was 25 multiple choice questions. The results obtained post-test average value of 87.95 with the lowest value of 44 and the highest value of 100.

Based on the results of the N-Gain test, it can be seen that the decrease category is 3 people (3.75%), stable 0 people (0%), low category 4 people (5%), average category 17 people (21.25%), and the high category is 56 people (70%). This data shows that the use of Edmodo can be said to be effective for improving learning outcomes in the subject of Plumbing Theory.

In the aspect of motivation, Edmodo is able to increase students' learning motivation in the subject of Plumbing Theory. This can be proven from the results of the average percentage of questionnaires on the motivational aspects of 74.59% which fall into the high category. This data shows that after using Edmodo students are more motivated to improve their learning in the subject of Plumbing Theory.

In the aspect of ease of access, Edmodo is recognized as having advantages in terms of ease of access. This can be proven from the results of the average percentage of questionnaires in the aspect of ease of access of 76.47% which fall into the very high category. This data shows that students as users find it easy to access Edmodo.

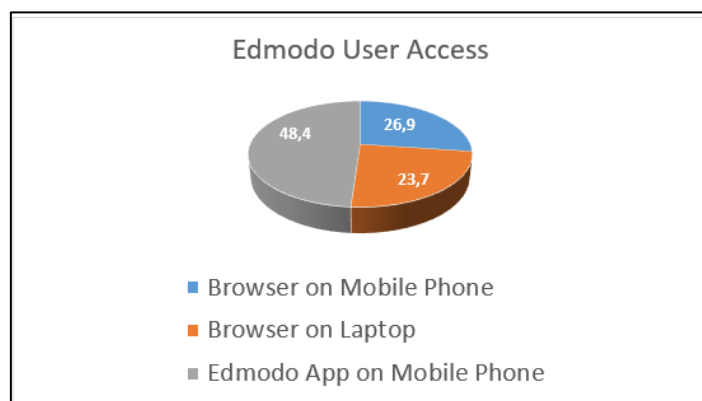


Figure 1. Access Diagram Using Edmodo

The figure 1 shows that 48.4% of students as Edmodo users have downloaded the Edmodo application on their respective mobile phones. While the rest is using the browser both on a laptop/PC, or on a mobile phone. This means that the use of Edmodo as a learning support is very easy to implement. Ease of use and user attitudes significantly affect the use of e-learning in universities (Arianto et al., 2020).

On the intensity aspect, an average of 70.60% of students stated that they access Edmodo with high intensity. This is in accordance with the actual conditions that the Theory/Practice Plumbing course learning utilizes Edmodo, both for quizzes, task collection, and discussion. In addition, the lecture material that will be discussed can be downloaded in the Edmodo class respectively.

Finally, the constraints aspect is given a choice: do not concentrate if you look at the screen of your laptop or mobile phone too long, laptop or mobile phone does not support, and internet network. The questionnaire results show that there are still students who have problems in accessing Edmodo. The problems are external constraint, not related to the Edmodo application.

Based on the data, the obstacle most frequently encountered by students of Edmodo is the internet network that does not support. This can be estimated because these students do not have internet quota or campus wi-fi networks that are difficult to access when in class. However, this obstacle does not rule

out the fact that the use of Edmodo can improve student learning outcomes of participants in the Plumbing Theory. The results of the calculation of the average percentage of the questionnaire of this study amounted to 71.67%. This can be interpreted that the response of students to the use of Edmodo as a learning media is included in the high category.

Learning media in the form of e-learning is a learning media that is currently widely used by educational institutions and educators or instructors independently. Judging from its name, e-learning stands for electronic learning. But according to Sukmadinata (2007) e-learning is not only as electronic learning but as experience, extended, and expended learning.

Edmodo is one of the social networking sites for educational purposes that combines the benefits of social networking with a safe and controlled environment that can allow teachers to operate freely. This application offers a personal platform to train the full potential of social networks for educational purposes. Inspired by Facebook, Edmodo developer designed the Edmodo interface which is similar to Facebook, so it is considered as Facebook for education (Scott, 2012). It is estimated that students who are used to using Facebook can use Edmodo without difficulties (Çankaya & Durak, 2013).

Hourdequin (2014) states that more students motivated, learners recognized the benefits of being afforded by the additional interactions they had with each other and with their online instructors. Media with advantages like this is very suitable for vocational school students. It is by the goals of vocational education, (Furi & Mustaji, 2017) stated that the most basic vocational education principle is that it must be able to develop students' potential optimally so that they have life skills to sustain their lives. Edmodo proved to be a simple and effective technological tool for enabling such interactions. In addition, Hourdequin (2014) concluded that Edmodo can improve student independence and learning outcomes in the Language class. One strategy that can be applied is to give responsibility to each student in turn regarding the theme of the discussion given to other students. This can increase interaction and become an effective tool to encourage students' critical thinking (Wahyuni et al., 2019). Besides that, Charoenwet and Christensen (2016) stated that the learning activities provided through Edmodo significantly improved self-learning behavior and students learning performance, with positive perceptions of the online learning environment. This is in line with the results of this study that Edmodo can improve independence and enthusiasm in learning the subject of Plumbing Theory.

Edmodo is considered as useful learning tool to complement traditional face-to-face classroom settings because it provides various features that support student learning. In addition, this is considered an effective learning tool because it increases motivation, flexibility, and student participation in online learning activities (Manowong, 2016). The features available in Edmodo make it easy for students to access the application. This has implications for the intensity of students in accessing Edmodo. Edmodo is more used in doing quizzes, collecting assignments, and accessing lecture material. These facilities have an effect on effectiveness to increase the level of probabilistic thinking of students rather than learning that uses existing learning materials (books). Therefore, learning materials using Edmodo can be used in the learning process. It can also be developed into other learning materials through Edmodo (Sujadi et al., 2017).

The use of Edmodo cannot simply replace the role of the instructor. Tripathi (2016) states that although online resources cannot fully replace teachers in the classroom but if it is planned in a manner that is integrated with conventional teaching methods it will have a positive impact on student academic achievement. Edmodo is a platform where teachers can integrate each element of effective classroom teaching. In addition, a student can participate in a technology class according to his choice of time and can learn at his own pace. This is reinforced by Wichadee (2017) statement that blended learning is more effective than traditional learning. Edmodo is an amazing learning platform that is very user-friendly so the data shows a positive attitude and a high level of acceptance by the participants. Edmodo can be a solution for instructors who have limited time and students who cannot take lessons in class. That is, students in the experimental group not only outperformed them in the control group in verbal

ability, but they also showed higher learning motivation. Students in the experimental group expressed a positive attitude towards Edmodo. The findings of this study have implications for English instructors, encouraging them to see how technology can facilitate learning and help learners produce better academic performance.

Thongmak (2013) concluded that in utilizing Edmodo, instructors / instructors must emphasize the benefits of using Edmodo, educate students how to use some of Edmodo's unknown features, encourage online collaboration environments, and treat students carefully. Edmodo has also been proven to be suitable for engineering students. As in Gómez et al. (2015) research which used a sample of ICT student research. He stated that the use of Edmodo as a learning experience was seen as positive. Edmodo is considered capable of developing 2020 media capabilities, virtual collaboration, cognitive management, and positive associations with UX. One thing that is the weakness of the online quiz on Edmodo is the same as on other platforms, the Evaluation system in essay form is not flexible in the examination. The system cannot check essay questions automatically. The examination must still be manual. They must be opened and read their answers individually (Muslim et al., 2019).

CONCLUSION

The conclusions from this study are Edmodo proves that it is effective in improving students learning outcomes of participants in the Theory or Practice Plumbing course. The post-test results showed a significant increase after students were given treatment in the form of Edmodo utilization compared to the pre-test results that had not been treated and Edmodo proves that is able to increase student's motivation in leaning plumbing theory and practice courses. Then, Edmodo proves that have advantages in the ease of access. Students participating in the Plumbing Theory course access Edmodo with high intensity because it utilizes Edmodo in learning. The last, the biggest obstacle experienced by students in accessing Edmodo is an Internet access network that does not support.

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