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Increasing Teaching Self-Efficacy Through TPACK-Based eLMA For Vocational Teacher Candidates

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Abstract: The purpose of this study was to test the effectiveness of implementing the TPACK-based UNIPMA e-learning (eLMA) to increase the self-efficacy of Electrical Engineering Education students who are prospective vocational teachers. This research was conducted by conducting trials in the Learning Planning course with a pretest posttest control group design. The instrument used in measuring self-efficacy is the Teacher Sense of Self-Efficacy (TSES) questionnaire. Based on the results of data analysis using the t-test, it was found that eLMA based on TPACK had a significant effect on increasing the self-efficacy of prospective vocational teacher students. These findings indicate that TPACK-based eLMA is effective for increasing student self-efficacy in the Learning Planning course.

Keywords: *effectiveness, eLMA, TPACK, self efficacy*

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INTRODUCTION

The problem of low self-efficacy can be seen from the fact that there are still many teachers who show their low ability to solve various problems, especially problems that arise in the learning process Gistituati (2016). Similar research was also conducted by Fitrianingsih (2015) stating that a teacher with low self-efficacy has a low desire to try new learning ideas or strategies that can improve student learning processes. When self-efficacy increases, performance, level of facing challenges and confidence in completing tasks and success in learning also increase. In addition, teachers with a high level of self-efficacy will show openness, have high communication skills, cooperative skills, high willingness to learn and wise (Karabiyik & Korumaz, 2014; Jaengaksorn et al, 2015). Research conducted by Yeşilyurt, et al. (2016) also stated that self-efficacy greatly determines a person's attitude. Increasing self-efficacy also means increasing positive attitudes, one of which is independence. Research conducted by Neto (2013) on 1194 teachers in Brazil also stated that self-efficacy is the strongest predictor of job satisfaction. Similar research was also conducted by Su (2016) in Taiwan involving 326 teachers who also stated that self-efficacy greatly influences a person's performance. Therefore self-efficacy is an important element that must be possessed by prospective teachers to be able to carry out effective learning. Research conducted by Yeşilyurt, et al. (2016) also stated that self-efficacy greatly determines a person's attitude. Increasing self-efficacy also means increasing positive attitudes, one of which is independence. Research conducted by Neto (2013) on 1194 teachers in Brazil also stated that self-efficacy is the strongest predictor of job satisfaction. Similar research was also conducted by Su (2016) in Taiwan involving 326 teachers who also stated that self-efficacy greatly influences a person's performance. Therefore self-efficacy is an important element that must be possessed by prospective teachers to be able to carry out effective learning. Research conducted by Yeşilyurt, et al. (2016) also stated that self-efficacy greatly determines a person's attitude. Increasing self-efficacy also means increasing positive attitudes, one of which is independence. Research conducted by Neto (2013) on 1194 teachers in Brazil also stated that self-efficacy is the strongest predictor of job satisfaction. Similar research was also conducted by Su (2016) in Taiwan involving 326 teachers who also stated that self-efficacy greatly influences a person's performance. Therefore self-efficacy is an important element that must be possessed by prospective teachers to be able to carry out effective learning. (2016) also stated that self-efficacy greatly determines a person's attitude. Increasing self-efficacy also means increasing positive attitudes, one of which is independence. Research conducted by Neto (2013) on 1194 teachers in Brazil also stated that self-efficacy is the strongest predictor of job satisfaction. Similar research was also conducted by Su (2016) in Taiwan

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In accordance with current needs, it is ensured that the skills, knowledge and attitudes of TVET teachers must be aligned with changes in technology, the needs of the world of work, as well as advances in equipment and machinery (Ismail, 2017). The use of technology in the teaching and learning process is inevitable to increase educational efficiency in accordance with the development of information technology in the 21st century (Yildirim & Sensoy, 2018). Development of learning by integrating information technology makes a significant contribution to the level of pedagogical practice of students (Brun & Hinostroza, 2014). . The results of this study are also supported by the results of research by Tay, et al (2012) and Hennessy, et al (2005) which stated that the use of information technology and computers will increase understanding of the content of knowledge and pedagogical abilities of teachers in classroom learning. Information processing skills are absolutely necessary to face the 21st century. Such competencies can and should be developed through the integration of technology into learning (Nazarenko, 2015).

Research conducted by Chai, et al (2017) states that the teacher's ability to prepare 21st century learning is identified through TPACK. Bibi & Khan (2017) and Yildirim (2018) state that TPACK is an effective learning base that must be carried out by integrating technology. Yildiz (2017) argues that teachers must have TPACK competencies to achieve success in integrating technology in

the teaching and learning process. successful 21st century learning involves understanding material or content, teaching methods, and utilizing information technology synergistically (Baya & Daher, 2015; Chai et al, 2013). The idea of TPACK also has a close relationship with increasing creativity, collaboration, and accountability in learning (Kutaka, 2015).

E-learning emerged as a new trend in the world of education. Research conducted by Nurgiansah (2021) states that the development of E-Learning provides many benefits as a support for increasingly modern learning. The use of UNIPMA e-learning (eLMA) provides a new color in the implementation of learning. Learning by using eLma is student-centered learning. Students are given the widest possible opportunity to construct their own knowledge. In line with this learning process Smith (2002) stated that self-efficacy is formed through four main sources, one of which is mastery experience. Mastery experience is considered the most influential source for 2 reasons: because it is directly experienced by the learner himself and the second is most often associated with effort and skill (obtained through the learning process). Therefore, to increase the self-efficacy of prospective vocational teacher students, the TPACK-based eLMA is implemented as a mastery experience.

METHOD

The trials intended at this stage are field trials. Tests were carried out with the aim of obtaining information related to the effect of using TPACK-based eLMA on increasing the self-efficacy of prospective vocational teacher students. The ultimate goal of the effectiveness test is to test the increase in self-efficacy of undergraduate Electrical Engineering Education students.

To test the effectiveness, an experiment was carried out with the following design:

Pretest	treatment	Posttest
Y1	X	Y2

(Sukardi, 2019: 235)

Where the pretest is the initial condition of students before being given treatment. The treatment in question is giving lectures using eLma based on TPACK. The instrument for measuring the self-efficacy of prospective vocational teacher students uses a questionnaire. The questionnaire used to assess self-efficacy uses the Teacher Sense of Self-Efficacy (TSES) instrument developed by Tschanen (2001) which consists of three aspects, namely: student involvement, learning strategies and classroom management. The choice of TSES is because the TSES instrument is suitable for assessing prospective teachers (Alkan, 2015) and is able to uncover all actions in learning (Mousavi, 2014).

RESULT AND DISCUSSION

The results of the TPACK-based eLma effectiveness test were based on the results of the self-efficacy questionnaire scores which were filled in by 19 students. From the TSES questionnaire, pretest and posttest data were obtained as follows:

Table 1. Descriptive Statistics

	N	Minimum	Maximum	Means	std. Deviation
Pretest	19	64.00	78.00	71.8947	3.99854
Postest	19	76.00	84.00	80.8947	2.13163
Valid N (listwise)	19				

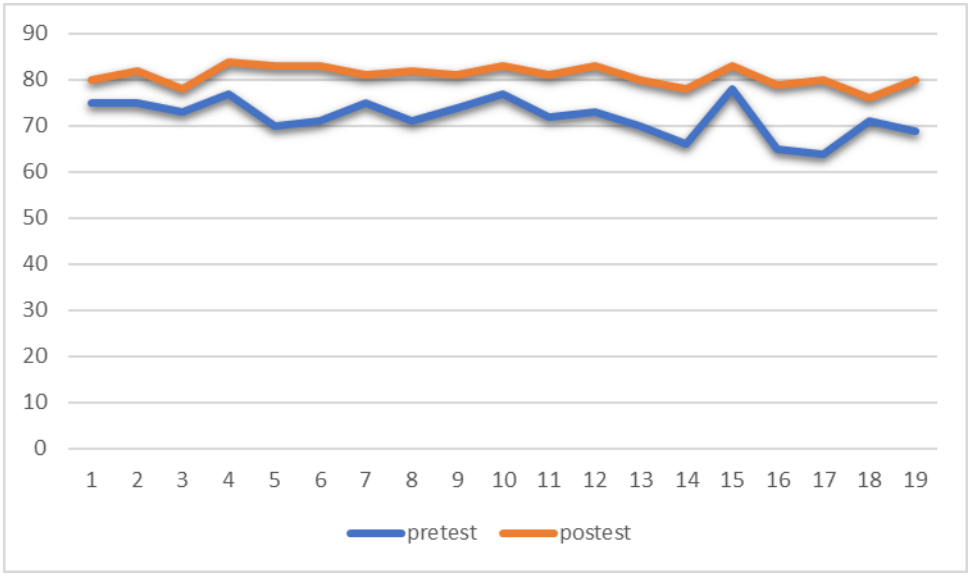

Figure 1 Student Self-Efficacy Ability

Table 1 shows students' self-efficacy during pretest and posttest. Based on the table above, it can be seen that the average pretest score was 71.89 with the lowest score 64 and the highest score 78. Meanwhile, the posttest average score was 80.89 with the lowest score 76 and the highest score 84. Based on these results, the data obtained increased which is significant from the results of the t-test analysis of 8.658 with a significance value of 0.020 which is <0.05 so that it can be interpreted that there is a significant difference between pretest and posttest. The improvement obtained shows that TPACK-based eLma is indeed effective. This can be explained as follows 1) Smith (2002) self-efficacy is formed through four main sources, one of which is mastery experience. Mastery experience is considered the most influential source for 2 reasons, namely: because it is directly experienced by the learner and the second is most often associated with effort and skill (obtained through the learning process). Therefore, to increase the self-efficacy of prospective vocational teacher students, it is carried out through the implementation of TPACK-based eLMA as a mastery experience. 2) Mukhadis (2016) states that the self-efficacy of

prospective teacher students is influenced by four factors, namely the level of confidence in their abilities, mastery of content knowledge, pedagogical knowledge and technological knowledge. The synergy of these four factors is referred to as the TPACK representation. Yuliati & Wartono (2016) explain TPACK is a form of knowledge that is complex and very important for prospective teachers. Yildiz (2017) states that teachers must have TPACK competencies to achieve success in learning. Therefore, through the application of TPACK-based eLma, learning success was obtained with significant t-test results between pre-test and post-test. 3) a similar study was also conducted byAriani (2015) in his research stated that the ability of TPACK andself efficacythe majority of respondents reported having a positive relationshipsignificant. In this research tooexplainedthat teachermustcan balance between TPACK andself efficacyin the learning process so that learning in class becomes fun and meaningful. The results of this study are also in line with pResearch conducted by Semiz & Ince (2012) stated that the construction of TPACK with technology integration significantly and positively influences the self-efficacy of prospective teachers to create effective learning. Research conducted by Erdogan & Sahin (2010) on prospective mathematics teacher students also stated that learning using TPACK effectively helps increase self-efficacy, where the self-efficacy of male teacher candidates is higher than the self-efficacy of female teacher candidates. In line with research related to the effect of TPACK on self-efficacy, Kramarski & Michalsky (2015) in their research results also stated that TPACK significantly affects self-efficacy.

CONCLUSION

The conclusion from this study is that eLMA based on TPACK is effective for increasing the self-efficacy of prospective vocational teacher students in the Learning Planning course. The statistical test using the T-test showed a value of 8,658 with a significance of 0.020, which means that there was a significant difference between the students' pretest and posttest. Integrating TPACK into learning increases the self-efficacy of prospective vocational teacher students because of its complex and comprehensive content.

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