Technological Pedagogical Content Knowledge Based Digital Learning and Application for Improving Student Learning Achievements

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Abstract. The integration of Information and Communication Technology (ICT) in current learning activities can spur student learning achievements.The framework for implementing ICT uses a Technological, Pedagogical And Content Knowledge (TPACK)-based Learning Model.Based on the combination of the application of the TPACK based learning model, the purpose of this study is to see an increase in learning outcomes for the Civics Learning Evaluation Assessment Course using TPACK based digital learning. This study uses a mixed methods approach consisting of qualitative and quantitative approaches in the form of Classroom Action Research using the Kemmis & McTaggart Model research design. The sample used in this study is a saturated sample with the research subject being the sixth semester student of the Pancasila and Civic Education Study Program, Faculty of Teacher Training and Education, Islamic University of North Sumatra in the academic year 2021.2. with 15 students. The data in this study were obtained from observations of lecturers' teaching activities in implementing TPACK based digital learning, observations of student learning activities in participating in TPACK-based digital learning, and test instruments for learning outcomes for the Pancasila and Civic Education Learning Evaluation Assessment subject. The findings of this study indicate that there is an increase in student learning achievements in the Pancasila and Civic Education Learning Evaluation Assessment subject by applying TPACK based digital learning.

Keywords: TPACK; Learning Achievements; Assessment; Evaluation Subjects

1 Introduction

We realize that the Era of Society 5.0 is a sign where humans have lived side by side with technology. In this era, all human activities are human-centered but also technology based. This situation requires learning to use the sophistication of digital technology that allows sharing of information presented in learning activities easily and quickly without having to be hampered by space and time [1]. The demands of digital learning are carried out by growing: (a) creative thinking and student innovation, (b) critical thinking and problem solving, (c)

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communication and cooperation, (d) information, media, and technology skills, (e) character building and student spiritual values [2]. This digital learning is considered effective and efficient because it can be done anywhere and anytime with a cellphone, android, laptop, or computer [5]. In this era of Society 5.0 digital learning, the role of lecturers shifts from educator-centered learning to student-centered learning [3]. In addition, lecturers have to learn a lot to improve their skills and competencies in designing information technology-based learning by displaying quality content and knowledge-based learning medi [4].

The learning of the Pancasila Education and Civic Education Learning Evaluation Assessment course develops knowledge, values, attitudes, and skills as measured by learning achievements. To improve student learning achievements, in learning activities during the Covid-19 period, learning activities are carried out in digital learning using the E-Learning platform. However, the learning achievements of the Pancasila and Civic Education Learning Evaluation Assessment courses in learning using E-Learning are still low. As it is known that the Assessment of Learning Evaluation of Pancasila Education and Civic is a course that examines the objectives, paradigms and types of assessment and evaluation, the key role of assessment in the learning process, assessment feedback, analysis of assessment data, and to inform evaluation results on Pancasila Education and learning. Civic. This course is given in the fifth semester with a weight of three semester credit systems.

During learning during the Covid-19 period, based on the results of interviews with students, there are several things that make student learning achievements low by using E-learning, namely (1) one-way learning activities so that there is no educative communication that has been built in learning activities, (2) learning problems posed in the E-learning platform, which are often responded to by lecturers according to the lecturer's time, (3) the absence of face-to-face learning activities makes the learning concepts of the Learning Evaluation Assessment of Pancasila and Civic Education subjects less well understood , (4) the absence of face-to-face in learning activities makes student motivation in learning low. Observing some of the weaknesses in the learning process of the Pancasila and Civic Education Learning Evaluation Assessment course, it is necessary for lecturers to be able to use digital-based learning innovations that are able to combine technology, pedagogy but do not reduce the content of learning materials that are able to build student knowledge in learning Evaluation Assessment courses. Learning Pancasila and Civic Education. The solution offered to solve these problems is by using TPACK-based digital learning. TPACK-based learning directs lecturers to master knowledge about how to facilitate students learning from subject matter content through pedagogical and technological approaches [5]. Technology Pedagogical Content Knowledge (TPACK) is a theory developed to explain a set of knowledge needed by lecturers to teach effectively, and to use technology [6].

TPACK-based learning has the potential to provide direction for lecturers to solve digital-based learning problems [7]. This TPACK-based digital learning in an integrated and integrated manner contains technological pedagogical content with digitalization which requires the ability of lecturers to use learning resources based on information communication technology. The TPACK framework consists of Knowledge Technology (TK), Pedagogical Knowledge (PK) and Content Knowledge (CK). Lecturer knowledge in the use of technology is needed to enable lecturers to understand the options from which they can choose, and to operate them efficiently in technological knowledge) for a particular domain in the curriculum (technology content knowledge). Knowledge of the features of technology-rich learning resources is important because it allows lecturers to distinguish the qualities and capabilities of a particular tool in relation to its pedagogical goals (technology pedagogy) and domain-specific learning (technology content). Knowledge of how to use technology-rich curricular

resources is necessary for teachers to be able to use ICT in a pedagogically meaningful way to achieve learning in a particular content area (technology pedagogical content knowledge) [8].

The framework is designed in learning activities for the Pancasila and Civic Education Learning Evaluation Assessment subject with the following steps: (a) Pedagogical Knowledge (PK) describes knowledge about the nature of learning the Pancasila and Civic Education Learning Evaluation Assessment subject with digital-based learning methods. In this activity, PK based on digitization is expected to be able to improve the ability of lecturers in concocting learning by looking at the needs of students; (b) Content Knowledge (CK) is a framework that is able to invite students to understand lessons that can organize and connect ideas and knowledge about rules, and evidence of content for the Assessment of Learning Evaluation of Pancasila and Civic Education courses; (c) Technological Knowledge (TK) is able to invite students to develop knowledge about digital-based technology; (d) Pedagogical Content Knowledge (PCK) is knowledge about pedagogy, learning practices and planning processes that apply and are in accordance with the Pancasila and Civic Education Learning Evaluation Assessment courses. PCK is related to the representation and formulation of concepts, pedagogical techniques, knowledge of what makes a concept difficult or easy to learn, and also knowledge of knowledge from previous students' epistemological theories.The entire TPACK framework applied to the Learning Evaluation Assessment of Pancasila and Civic Education courses above is interrelated with each other. The use of digital-based TPACK learning can certainly improve learning achievements for the Pancasila and Civic Education Learning Evaluation Assessment subject.

Based on the results of research conducted by Wilujeng, Tadeko, & Dwandaru (2021) it shows that the use of TPACK-based digital learning has a positive effect on the pedagogical competence of science teachers in their preparation for learning in the classroom [9]. Atun & Usta (2019) also found that TPACK-based digital learning has provided relevant content for learning, and in accordance with current technology has built high-level skills of students so as to improve students' academic achievement [10]. The results of Atun & Usta's research (2019) are in line with the opinion of Kurniawan & Sumargono (2021) who stated that TPACK-based digital learning has proven to have an effect on student learning achievement. The results of data analysis show that the TPACK-based digital learning process has a significant and higher effect on optimizing student learning achievement. The TPACK-based digital learning process makes students more active in participating in learning activities and can improve hard skills and soft skills, attracting students' attention so that they focus more on the material presented by educators [11].

2 Methods and Material

2.1 Research Methodology

The research method uses a mixed methods approach which is presented in the form of classroom action research. The sample of this research is in the form of a saturated sample with the research subject being the sixth semester student of the Pancasila and Civic Education Study Program, Faculty of Teacher Training and Education, Islamic University of North Sumatra in the academic year 2021.2. with 15 students. The role and position of the researcher in this study is as a lecturer who acts directly in carrying out learning activities for the Assessment and Evaluation of Pancasila and Civic Education Learning Course assisted by two observers. The research was carried out in three cycles with the stages of (1) planning, (2)

action, (3) Observing, and (4) analysis and reflection on learning problems for assessment and evaluation of Pancasila and Civic Education Learning Course. The research design used the Kemmis & McTaggart model. The research steps using the Kemmis & McTaggart model can be seen in Figure 1. below:

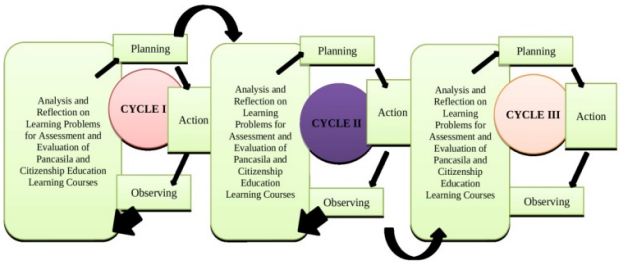

Fig. 1. TPACK-based Digital Learning Class Follow-Up Research Design in the Assessment Course on Evaluation of Pancasila and Civic Education Learning Using the John Eliot Model.

2.2 Material and Analisis Data

Data collection in this study used mixed methods with qualitative and quantitative data. The use of data collection techniques in this study consisted of quantitative and qualitative data in the form of test instruments for learning achievements for the Pancasila and Civic Education Learning Evaluation Course, while qualitative data was obtained based on observations through lecturer activity sheets in implementing TPACK-based digital learning and observations on student activity sheets in participating in TPACK-based digital learning.

Lecturer activity observation sheets can be seen in the following activities: (1) Lecturers teach materials for Digital-based Pancasila and Civic Education Learning Evaluation Assessment Subjects using communication and information technology (2) Use of technology in digital learning strategies with a pedagogical approach through online face-to-face activities and online discussions, (3) Lecturers present learning materials using digital access so that students can learn with various digital accesses, (4) Lecturers combine elements of pedagogy, course materials and Information and Communication Technology in learning strategies with content for Educational Learning Evaluation Assessment Course material Pancasila and Civic by linking the background and abilities of students. Then, student activities taking part in TPACK-based digital learning activities can be seen from the following activities: (1) students learn digitally using information communication technology that is adapted to their psychological, psychological IQ, and social development with the materials and learning media used , (2) Students are taught with digital learning strategies that use a pedagogical approach, and are assessed with digital assessments, (3) Materials for Assessment of Learning Evaluation of Pancasila and Civic Education are given using access to communication and information technology and students learn with various access to technology communication and information. The instrument for learning outcomes for the Learning Evaluation Assessment of Pancasila and Civic Education in this research activity consisted of 30 (thirty) items in the form of an Essay Test which was given through the LMS platform.

Success in this research can be seen from the success of teaching lecturers, student activities, and student learning achievements. Indicators of success from this classroom action research can be seen from: (1) the results of observations of lecturers' teaching activities are said to be successful if they reach a score of 46-50% in a good category, (2) student activities are said to be successful if they reach a score of 36-45% in a good category, (3) learning

achievements of the Pancasila and Civic Education Learning Evaluation Assessment Course are said to be successful if the percentage of achievement is 70%

3 Result and Discussion

3.1 Result

3.1.1 Lecturer Teaching Activities in Implementing Technological Pedagogical Content Knowledge Based Digital Learning

Based on the recapitulation of the observation results of lecturers' teaching activities in implementing TPACK-based digital learning in the Pancasila and Civic Education Learning Evaluation Assessment Course, it can be seen that the average score in the first cycle is 40.50, in the second cycle the average score is 43.50, and in the second cycle the average score is 43.50. cycle III average score of 47.50. The achievement of indicators of classroom action research on lecturers' teaching activities in cycle III has reached indicators of success in this research. Increasing lecturers' teaching activities in implementing TPACK-based digital learning is shown in Table 1. below:

Table 1. Recapitulation of Observation Results of Lecturers' Teaching Activities in the Assessment Course on Evaluation of Pancasila and Civic Education Learning Using TPACK Based Digital Learning

No	Observer	Cycle 1	Cycle 2	Cycle 3
1	1	42	45	48
2	2	39	42	47
Total		81	87	95
Average		40,50	43,50	47,50
Rating Category		Sufficient	Sufficient	Good

3.1.2 Student Learning Activities in Participating in Technological Pedagogical Content Knowledge Based Digital Learning

Based on the recapitulation of the results of observations on student learning activities in TPACK-based digital learning activities in the Pancasila and Civic Education Learning Evaluation Assessment Course, the average score in the first cycle was 32.50, in the second cycle the average score was 34.50, and in the second cycle the average score was 34.50. III average score of 37.50. The achievement of indicators of classroom action research on student learning activities in cycle III has reached indicators of success in this research which can be seen in Table 2. below:

Table 2. Recapitulation of Observation Results of Student Learning Activities in the Assessment Course on Evaluation of Pancasila and Civic Education Learning Using TPACK Based Digital Learning

No	Observer	Cycle 1	Cycle 2	Cycle 3
1	1	31	34	37
2	2	34	35	38
Total		75	69	75
Average		32,50	34,50	37,50
Rating Category		Sufficient	Sufficient	Good

3.1.3 Improving Student Learning Achievements in the Assessment Course on Evaluation of Pancasila and Civic Education Learning Using Technological Pedagogical Content Knowledge Based Digital Learning

Based on the results of the recapitulation of learning achievements for the Assessment and Evaluation Course of Pancasila and Civic Education Learning by using digital learning based on TPACK cycle III, it has obtained an achievement percentage interval of 70%. This shows that the achievement of indicators of classroom action research on student learning achievement in cycle III has reached the indicators of success in this study. The increase in student learning activities in TPACK-based learning as learning integration in Era Society 5.0 can be seen in Table 3. below:

Table 3. Recapitulation of Student Learning Achievements in the Assessment Course on Evaluation of Pancasila and Civic Education Learning Using TPACK Based Digital Learning

Interval percentage of achievement of learning achievements	Average Results of Cycle Action Analysis I		Average Results of Cycle Action Analysis II		Average Results of Cycle Action Analysis III	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
90- 100 %	3	20.00	7	46.67	8	53.33
81-89 %	2	13. 33	4	26.67	5	33.33
76-80 %	2	13.33	1	06.60	2	13.33
70%	2	13.33	2	26.67	0	00.00
<60 %	6	40.00	1	06.60	0	00.00
Total	15	100	15	100	15	100

3.2 Discussion

Looking at the research findings above, it can be seen that the implementation of TPACK-based digital learning implementation has proven to improve learning achievements for the Pancasila and Civic Education Learning Evaluation Assessment Course for students in the fifth semester of the Pancasila and Civic Education Study Program, Faculty of Teacher Training and Education, Islamic University of North Sumatra. The findings of this study have added to our knowledge base that TPACK-based digital learning has a positive effect on the competence of lecturers to use technology in their preparation for learning in class. The findings of this study are in line with the findings of research conducted by Susilawati, Khaira, & Renaldi (2021) which states that many lecturers use TPACK because (1) it is easy and efficient in delivering material and does not need to write; (2) generate motivation; (3) improve student effectiveness; (4) help students understand the material; and (5) easier to use and more fun. The results of this study indicate that technology can foster independent or collaborative learning while at the same time providing competence to students to have the ability to use technology. The findings of this study are in line with the results of research by Susilawati, Khaira, & Renaldi (2021) which states that learning using technology is able to provide technological competence and students' seriousness in learning will be higher and higher education services to the interests of students can be carried out using technology.

TPACK based digital learning is proven to be effective in improving learning in a practical way because it provides interactive content, provides rapid learning feedback, diagnoses student learning needs, provides an effective way to remediate student learning difficulties, assesses student learning processes and outcomes or stores examples of work results. Students

digitally that will be used to improve learning outcomes for the Pancasila and Civic Education Learning Evaluation Assessment Course. In this TPACK-based digital learning, students' reflection process can be supported by computers that can make them alert/aware and can direct their thinking and thus put students in charge of their own decisions in learnin. The findings of this study also show that TPACK-based digital learning has made it easier for lecturers and students to learn by using technology where lecturers and students take an active role in shaping an effective learning environment. The need for technology today is important for lecturers and students in the Era of Society 5.0 as it is today. In addition, lecturers and students can use technology in a different way from its original design which may not be desirable, but the technology can be used creatively.

The implication of this research is that in facing the Era of Society 5.0, based learning becomes a solution to learning problems in the Civics Assessment and Evaluation course. TPACK-based learning is able to fulfill the main abilities most needed to face the Era of Society 5.0, namely being able to solve complex problems, critical thinking, creative, human management skills, being able to coordinate with others, emotional intelligence, ability to judge and make decisions, oriented to prioritize service, negotiation skills, and cognitive flexibility. TPACK-based learning is able to accommodate student needs in technology needs by integrating virtual space and physical space into one so that everything becomes easy with artificial intelligence. Era Society 5.0 human work and activities will be focused on Human-Centered based on technology. However, if humans do not follow the development of technology and knowledge, then Society 5.0 is still the same as the era of disruption which is like a double-edged sword. On the one hand, it can eliminate existing jobs, but it can also create new jobs. The right step in preparing Indonesian Human Resources and strengthening the quality of education and competence for students is to provide TPACK-based learning.

4 Conclution

Based on the research findings of TPACK based online learning and its application in improving learning outcomes of the Pancasila and Civic Education Learning Evaluation Assessment Course, it can be concluded that: (1) there is an increase in lecturer activity in using TPACK-based digital learning and has achieved indicators of success with good categories in this study, (2) there is an increase in student activity in participating in online learning based on achieving indicators of success with a good category in this study, (3) there is an increase in learning achievements for the Pancasila and Civic Education Learning Evaluation Assessment Course in semester V students of the Pancasila and Civic Education Study Program, Faculty of Teacher Training and Education. and Educational Sciences at the Islamic University of Sumatra and has achieved the percentage indicator of achievement of 70% in this study.

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