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The Role of Technological Pedagogical Content Knowledge (TPACK) Instruction in Enhancing Creative Economic Thinking Abilities

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Abstract

Economics lessons are still perceived as boring due to the use of lecture-based teaching methods. This leads to a lack of students' ability to develop creative thinking potential and makes students tend to be passive. Therefore, an appropriate teaching method is required, namely the TPACK teaching method. The objective of this research is to determine the effectiveness of TPACK-based instruction in enhancing the creative thinking abilities of high school students in economics. This research is a quantitative research employing an experimental method with a nonequivalent control group design. The data collection techniques utilized in this research involve observation and testing methods. Based on the analysis results, the t-test calculations conducted using SPSS present an average score of 78.85 for the experimental group, which is higher when compared to the average score of 74.90 for the control group. This indicates that the enhancement of students' creative thinking abilities in economics using TPACK-based learning is more effective compared to the enhancement of students' creative thinking abilities using conventional learning.

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INTRODUCTION

The advancement of knowledge and technological sophistication, as characteristic of the 21st century, exerts a significant influence across various aspects of life, including the realm of education. The rapid progress and development of technology demand that the education system adapts and aligns with the current changes (Kusaini et al., 2022). The educational curriculum should also be developed to foster the acquisition of both *hard and soft skills* that are useful in various situations, such as critical thinking, creativity, innovation, interpersonal skills, global thinking, and preparedness to face challenges in the era of industrial revolution (Mukhlasin, 2019). In relation to this, educational institutions are required to prepare students to face a life filled with challenges and competition due to the advancement of knowledge and technology.

Teachers play a crucial role in the learning process. They need to be trained to effectively integrate technology into the teaching process (Baier & Kunter, 2020). The existing learning resources should be integrated with other sources, such as print materials, audio, audio-visual, and computer-based resources. Additionally, utilizing *handphones* as a form of *mobile learning.* Learning is a process of interaction between teachers and students aimed at achieving learning objectives. Learning can be more effective when incorporating technology in the teaching process. (Raman, 2014). Teachers should possess knowledge that encompasses content, pedagogy, and technology to achieve the learning objectives (Bakar et al., 2020).

Current learning is one-directional, centered around the teacher as the provider of material through lecture methods. The dominant use of lecture-based teaching means teachers take the lead, while students become mere listeners and note-takers, resulting in limited opportunities for students to develop their thinking (Fitriyantoro & Prasetyo, 2016). Optimal learning is a two-way process involving both students and teachers. In addition to the teacher's role, students are also expected to actively participate in the learning process. This enables the creation of interactions between teachers and students.

Economics education is closely related to students' everyday lives. In economics education, students are required to interpret the content of the lessons and demonstrate the ability to solve problems within their surroundings. However, sometimes in the learning process, many students still perceive economics as a boring subject, attributing this sentiment to the lack of instructional media employed by teachers to assist students in comprehending the material. Consequently, students are hindered in their development of creative thinking skills. The utilization of technology in education is also not yet fully integrated into every lesson due to inadequate facilities (Singh & Kasim, 2019).

One of the abilities that need to be possessed to face the *super smart society* includes the ability to solve complex problems, critical thinking, and creativity (Rachmawati et al., 2015a). Creativity is the capacity for creative thinking, collaborating (developing) ideas, and the ability to evaluate an object or situation. (Saefudin, 2012). High creativity indicates that an individual is capable of thinking creatively (Mulyaningsih & Ratu, 2018a). Creative thinking ability is considered important as it cultivates a strong sense of curiosity, willingness to experiment, and enjoyment of exploration in students. Moreover, it enables learners to generate new ideas in their learning process. (Vikria Namania, 2019). The indicators of creative thinking encompass four aspects: *1) fluency thinking, 2) flexible thinking, 3) original thinking, and 4) elaboration ability*. (Munandar, 2012).

One of the challenges encountered in the learning process is the lack of students' creative thinking abilities in the classroom during lessons. This is due to the insufficient training of students' creative thinking skills, as the learning process is primarily centered around the teacher. Students' creativity is gauged by their high levels of interest and engagement in activities. (Susanto et al., 2013). Teachers are expected to be able to create challenging learning conditions to enhance students' creative thinking abilities, thus achieving the intended learning objectives.

Numerous factors influence the development of students' creative thinking abilities. The research (H. R. Dewi et al., 2019) explains that creative thinking skills in Indonesia are still notably low. This fact is corroborated by the results of *The Global Creativity Index* in 2015, where Indonesia was ranked 115th out of 139 countries. The low competence in students' creative thinking is attributed to the inadequate training provided by teachers in fostering students' creative thinking skills. This is confirmed by students' responses, which tend to focus on memorization rather than understanding concepts. This tendency arises from the language used in teaching, which tends to mirror the content of the textbooks. (Hidayat & Widjajanti, 2018). The research (Swestyani et al., 2014) conducted with 7th-grade students at SMPN 1 Karangsambung, Kebumen, yielded results showing low competence in creative thinking (among the control group students). The research (Kusuma et al., 2018) indicates that students' competence in creative thinking, specifically in the indicators of *flexibility* and *elaboration*, is still relatively low. In line with the research (Sekar et al., 2015) which also indicates that the indicators of flexible and *elaborative* thinking have a lower percentage compared to the indicators of fluent and original thinking.

A teacher should be capable of creating a learning environment that facilitates the enhancement of students' creative thinking abilities and employing various strategies to maximize it. Teachers must be creative in facilitating learning, not only using internet technology for necessities but also harnessing it to enhance the teaching and learning process (Sartono, 2016).

SMA Masehi 2 PSAK is a school known for its school motto "WEAVE ACHIEVEMENT," which stands for Honest, Open, Disciplined, Achievement, and Beautiful Ethics. SMA Masehi 2 PSAK is one of the selected schools designated as a driving force in education. The school employs a technology-integrated learning system. However, in the implementation of the learning process, there are still limitations both among the teachers and students of SMA Masehi 2 PSAK. The limitations in the execution of the learning process are related to the insufficient proficiency in utilizing technology, as well as the lack of resources (smartphones and laptops). All of these challenges are experienced by a portion of the students. The teachers at SMA Masehi 2 PSAK take action by encouraging students to engage in the teaching and learning process that is connected with technology, such as using platforms like WhatsApp groups, Google Classroom, and delivering content through LCD presentations. The utilization of various media is tailored according to the teachers' capabilities, which are required to effectively communicate during the guidance and support activities in the student learning process.

Based on the interview results conducted by the author with the economics subject teacher at SMA Masehi 2 PSAK Semarang, it is observed that students' creative thinking abilities are still insufficient and have not yet developed. This can be seen from the following symptoms: 1) Some students still struggle to provide ideas or problem-solving solutions during economics learning, evident when the teacher asks questions and students do not provide answers or responses to the questions posed by the teacher.. 2) Some students still struggle to develop or elaborate on concepts within economics education, evident when they are unable to accurately respond to questions provided by the instructor. 3) Some students still lack the ability to express several opinions during economics learning. 4) Some students remain passive and lack curiosity towards economics lessons.

The low level of creative thinking among students at SMA Masehi 2 PSAK Semarang is evident in the economics learning process in the classroom. Furthermore, challenges faced in economics instruction include the limited use of media, such as the lack of video incorporation during the teaching process. Teachers serve as the primary guide in the implementation of classroom instruction, emphasizing the necessity for teachers to possess professional competencies that enable them to nurture creative and innovative students. Competent educators have the capacity to enhance students' creative thinking abilities. The ability to think creatively assists learners in generating new ideas based on their existing knowledge to solve

problems from various perspectives. Hence, it is essential for educators to optimize students' creative thinking competencies in the teaching process (S. Dewi & Kelana, 2019).

Based on the symptoms of low creative thinking mentioned above, it is necessary to improve and enhance students' creativity, such as in solving creative thinking problems. One way to address this issue is through the selection of appropriate models, approaches, methods, and learning strategies, one of which is TPACK (Kodri et al., 2020). TPACK is a form of instruction that integrates three aspects: technology, pedagogy, and content/knowledge (Amrina et al., 2022). TPACK serves as a framework designed to understand the relationship between teaching knowledge and technology utilization (Etzkorn, 2018). When educators possess a comprehensive understanding of technological knowledge, the teaching process can attain optimal outcomes (Absari et al., 2020). TPACK is divided into seven components, namely: 1) *Content Knowledge* (CK), 2) *Pedagogical Knowledge* (PK), 3) *Technological Knowledge* (TK), 4) *Pedagogical Content Knowledge* (PCK), 5) *Technological Content Knowledge* (TCK), 6), *Technological Pedagogical Knowledge* (TPK), dan 7) *Technological Pedagogical Content Knowledge* (TPACK). The level of mastery of the TPACK method is closely related to content, where its stages need to be undertaken following the measurement of integrated technological abilities. Thus, during the teaching and learning process, educators can tailor subject matter to the instructional tools that will be employed (A. Hidayat, 2019). The TPACK model demonstrates that integrated content knowledge, technology, and pedagogical skills are essential conditions for creating innovative teaching using technology (Baser et al., 2016).

Previously, a pertinent research on TPACK was conducted by (N. Hayati, 2023), which demonstrated that the TPACK approach in science instruction could enhance the learning outcomes of 9th-grade students at MTs Negeri 5 Klaten. This was evident in the pre-cycle phase where the level of students' proficiency was only 43.33%. In Cycle I, the proficiency level increased to 86.67%, and in Cycle II, it reached 93.33%.

Subsequently, a research by (Nurrohmah et al., 2022) is worth noting. The results indicated that the utilization of TPACK in instructional activities could assist learners in becoming more focused and experiencing ease in comprehending subject matter, owing to the engaging presentation of content. The learning outcomes during the pre-cycle phase showed that 60% of the learners had not achieved the Minimum Competency Standard (KKM). In Cycle I, the number of learners reaching the KKM increased to 70%, and in Cycle II, it reached 90%.

Another research conducted by (Khaira et al., 2021) investigated this matter. The results indicated an improvement in student learning outcomes in the Health Economics course through the implementation of a TPACK-based instructional design. Looking at both Cycle I and Cycle II with an average score of 56.60, in Cycle II the average score was 77.30, and in Cycle III the average score was 85.40. The achievement of student learning outcomes in the Health Economics course has reached the success indicator in this research, falling within the range of an average score of 80.

The objectives of this research are as follows: 1) To investigate whether instruction using the TPACK framework can enhance the creative thinking abilities of economics students. 2) To determine whether the improvement in economics students' creative thinking abilities using the TPACK framework is more effective than the improvement achieved through conventional instruction.

RESEARCH METHODS

This research employs a quantitative approach using an experimental method. The type of experiment utilized in this research is a *quasi-experimental* design, which seeks to establish the presence or absence of a cause-and-effect relationship, as well as the extent of that cause-and-effect relationship, by administering treatments to the experimental group and comparing the outcomes with a control group (Santosa, 2012). The experimental method is always employed with the intention of observing the effects of a treatment.

The research design utilized is the *Nonequivalent Control Group Design. The Nonequivalent Control Group Design* is a design similar to the *pretest-posttest control* group design, with the distinction that both the experimental and control groups are not randomly selected but based on predetermined classes. The population used in this research comprises all the students in class X of SMA Masehi 2 PSAK Semarang, totaling 42 students. The sample for this research was selected using purposive sampling, which involves the deliberate selection of samples based on specific considerations. The considerations were based on the fact that there is a lack of interest in economics learning, as indicated by assessments from the economics subject teacher during the instructional process. The sample for this research consisted of 22 students from class X IPS1 and 20 students from class X IPS2.

The data collection techniques employed in this research are observation and testing. Observation in this research is utilized to observe students' activities during the instructional process, enabling the measurement of the enhancement in students' engagement. The data collection technique employed a test format consisting of a *pretest and posttest,* each containing 5 open-ended questions. The pretest was administered before the treatment to assess students' initial knowledge upon entering the instructional phase. The *posttest,* on the other hand, was conducted after applying the treatment involving the TPACK instructional approach aided by instructional videos, aimed at gauging students' creative thinking abilities and their understanding of the presented material. According to Arikunto (2013), validity is the extent of a measurement that indicates the level of authenticity of an instrument. To ascertain whether a test is valid or not, an examination of the test blueprint must be conducted to ensure that the test items adequately represent the entirety of the material that should be comprehended proportionally. The validity employed for open-ended questions utilized content validity. Content validity pertains to the accuracy of an instrument in terms of the material being assessed. The instrument, in the form of a written test, was compared with the fundamental competencies, indicators, and topics that were to be taught. Reliability is the level of accuracy (consistency) of a test, indicating to what extent the test can be trusted to yield consistent scores.

The data analysis technique employed in this research was derived from quantitative data, specifically the assessment of creative thinking abilities through *pretest* and *posttest* results, as well as the evaluation of TPACK component aspects using tests for normality, homogeneity, hypothesis, and N-Gain.

RESULTS AND DISCUSSION

Based on the *statistical data*, the experimental class achieved an average score of 78.85, which is higher compared to the control class average of 74.90. Hence, it can be concluded that the experimental class with TPACK instruction is more effective than the control class with conventional instruction.

The research data results, analyzing the enhancement of students' creative thinking abilities in economics, were conducted to *determine* the extent to which the treatment in the experimental group could elevate the creative thinking abilities of economics students in the experimental class.

There is an increase in the average *pretest* to posttest scores in the experimental class when employing the TPACK instructional method. After providing treatment to the experimental class using the TPACK instructional approach aided by instructional videos, the average *posttest* scores were higher compared to the average *pretest* scores. In the *technological knowledge* (TK) indicator, the average *pretest* score was 50% lower than the average *posttest* score of 75%. In the *pedagogical knowledge* (PK) indicator, the average *pretest* score was 51% lower than the average *posttest* score of 79%. In the *content knowledge* (CK) indicator, the average *pretest* score was 50% lower than the average *posttest* score of 78%. In the *technological content knowledge* (TCK) indicator, the average *pretest* score was 49% lower than the average *posttest* score of 82%. In the *pedagogical content knowledge* (PCK) indicator, the average *pretest* score was 48% lower than the average posttest score of 76%. In the *technological pedagogical knowledge* (TPK) indicator,

the average pretest score was 49% lower than the average *posttest* score of 78%. Finally, in the *technological pedagogical* and *content knowledge* (TPACK) indicator, the average *pretest* score was 49% lower than the average *posttest* score of 75%. This indicates that the utilization of the TPACK method can enhance the creative thinking abilities of economics students.

Instruction utilizing the *Technological Pedagogical Content Knowledge* (TPACK) framework can enhance the creative thinking abilities of economics students.

The results of the N-gain test calculations using both SPSS and *Microsoft Excel* demonstrate an increase in the average scores from *pretest to posttest* in the experimental class. This implies that instruction employing the TPACK framework can enhance the creative thinking abilities of economics students. This is substantiated by the attainment of average results after the *treatment* was administered to the experimental class, utilizing the TPACK teaching method aided by instructional media in the form of videos. The average scores obtained from the *posttest* were higher compared to the average scores from the *pretest* for all indicators, namely *technological knowledge* (TK), *pedagogical knowledge* (PK), *content knowledge* (CK), *technological content knowledge* (TCK), *pedagogical content knowledge* (PCK), *technological pedagogical knowledge* (TPK), dan *technological pedagogical content knowledge* (TPACK).

This is consistent with Syahidah's (2023) research, based on the outcomes of research that has been conducted through the implementation of the TPACK-based *mind mapping* instructional model, which demonstrates an influence on the enhancement of students' creative thinking abilities. This influence is substantiated by the N-Gain values and aligns with the results of hypothesis testing using the Z test at a significance level of 5%, indicating that $Z_{calculated} > Z_{table}$. The overall average N-Gain has met the hypothesis criteria, which is N-Gain > 30. The indicator of creative thinking in the *elaboration* aspect falls under the high N-Gain category, while in the *originality* aspect, it falls under the moderate N-Gain category. Indicating that the hypothesis is accepted, or there is an influence of the TPACK-based *mind mapping* instructional model in enhancing students' creative thinking abilities.

The results of this research are also in line with Piaget's theory of cognitive learning, explaining that an individual's behavior is determined by their perception or understanding of interconnected situations. Hence, students' creative thinking abilities can be developed according to their potential. In the learning process, students don't just acquire a collection of knowledge, but they also have the opportunity to cultivate creative thinking skills in acquiring knowledge (concept discovery). Thus, students' reasoning will be enhanced, as they are capable of connecting the concepts they acquire through learning. According to Piaget, cognitive development largely depends on the extent to which a child actively interacts with their environment (Trianto, 2014:31). The following are significant implications within the instructional model derived from Piaget's theory: 1) Focusing attention on a child's thinking process or mental processes, rather than solely on the outcomes. 2) Recognizing the crucial role of a child's initiative and active involvement in learning activities. 3) Acknowledging the existence of individual differences in terms of developmental progress. Piaget's theory assumes that all students go through the same sequence of development, but this growth occurs at varying rates. The implication in the learning process through the use of the TPACK method, which encompasses core components (knowledge, pedagogy, and technology), is that it fosters self-confidence and understanding. As a result, students become active and take initiative in generating new ideas within the learning context, thereby enhancing their creative thinking abilities. The description of the research results, combined with previous research results, serves as a foundation and leads to the conclusion that instruction using the TPACK approach can enhance students' creative thinking abilities in economics.

The improvement of students' creative thinking abilities in economics using the *Technological Pedagogical Content Knowledge* (TPACK)

instructional approach is more effective than enhancing the creative thinking abilities of students in economics who are taught through conventional instruction.

Based on the results of the t-test hypothesis calculation using SPSS, the presented outcome shows a significance value of 0.019 < 0.05, indicating that H0 is rejected and H1 is accepted. This implies that the enhancement of students' creative thinking abilities in economics using the TPACK instructional approach is more effective than enhancing the creative thinking abilities of students taught through conventional instruction. This is evidenced by the attainment of an average score of 78.85 in the experimental class, which is higher compared to the average score of 74.90 in the control class.

This is in line with the research conducted by Irawan in 2022, which indicates that the data on students' science learning outcomes holds a significance value of 0.003. Considering the obtained significance value is < 0.05, it can be concluded that the null hypothesis (H_0) is rejected, thereby accepting the alternative hypothesis (H_1), which states "There is an Influence of the Implementation of the TPACK Approach on Science Learning Outcomes." Based on the conducted t-test, it is shown that there is an influence of the TPACK approach on science learning outcomes. Therefore, it can be stated that the science learning outcomes of students using the TPACK approach are higher than those of students who do not use the TPACK approach. This is evidenced by the difference in the means between the experimental class, which employed the TPACK approach, and the control class, which did not utilize the TPACK approach. Based on the research results supported by theoretical underpinnings, the researcher can conclude that the utilization of TPACK-based instruction is effective in enhancing students' creative thinking abilities in Economics within high school education.

CONCLUSION

Based on the research results, conclusions can be drawn as follows: 1) Teaching using TPACK can enhance students' creative thinking abilities in economics, as evidenced by the *statistical analysis* calculation using the t-test, which presents a calculated t-value > t-table and a significance value < 0.05, indicating the acceptance of H_1. 2) The enhancement of students' creative thinking abilities in economics using TPACK-based instruction is more effective compared to the enhancement of students' creative thinking abilities in economics using conventional instruction. This is demonstrated by the increase in the average pretest to posttest scores in the experimental class across all indicators, namely TK, PK, CK, TCK, PCK, TPK, and TPACK.

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