

THE IMPLEMENTATION OF CANVA QUIZ IN THE THINK-PAIR-SHARE MODEL ON SELF-CONFIDENCE AND MATHEMATICAL CONNECTION SKILLS

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Abstract [Arial, 12-point, bold, centred]

This study aims to determine the simultaneous effect of implementing the Think Pair Share (TPS) learning model integrated with Canva Quiz on students' self-confidence and mathematical connection skills. The study employed a quantitative approach using a pre-experimental method with a one-group pretest-posttest design. The research was conducted with 31 tenth-grade students at SMA Negeri 3 Kota Tegal, selected through purposive sampling. The instruments consisted of a self-confidence questionnaire and a mathematical connection skills test that had met the validity and reliability requirements. Data were collected through interviews, documentation, questionnaires, and tests. Before hypothesis testing, the data were analyzed using normality and homogeneity tests as prerequisite analyses. The hypothesis was then tested using Repeated Measures Multivariate Analysis of Variance (MANOVA) to examine the simultaneous effect of the implementation of Think Pair Share with Canva Quiz on both dependent variables. The results showed a Wilks' Lambda value of 0.462, $F = 16.904$, and $\text{Sig.} = 0.000$ ($p < 0.05$), indicating a significant simultaneous difference between the pretest and posttest scores. Descriptively, the mean self-confidence score increased from 43.323 to 44.065, while the mean mathematical connection skills score increased from 69.194 to 82.968. These findings indicate that integrating the Think Pair Share learning model with Canva Quiz creates a more interactive and collaborative learning environment, contributing simultaneously to the improvement of students' self-confidence and mathematical connection skills.

Keywords: Think Pair Share, Canva Quiz, Self-Confidence, Mathematical Connection Skills

1 INTRODUCTION

Education is a systematically organized process designed to create a learning environment that facilitates the optimal development of students' knowledge, skills, and attitudes. This process is implemented through educational institutions that function as environments for developing individuals through structured learning experiences and interactions. In formal education, learning activities are systematically organized based on common educational objectives, curriculum standards, and instructional materials to ensure the achievement of learning outcomes (Irsalulloh & Maunah, 2023). The success of education is strongly influenced by teachers' ability to design learning experiences that actively engage students throughout the instructional process while preparing them to face academic and real-life challenges (BP et al., 2016). Furthermore, education plays an essential role in developing students who are intellectually competent, socially responsible, and emotionally prepared to respond to the demands of the twenty-first century (Salam, 2017).

Mathematics is one of the fundamental disciplines that contributes significantly to the development of logical, systematic, analytical, and critical thinking. The concepts in mathematics are closely interconnected and form an integrated body of knowledge, while many mathematical topics are also based on numerical reasoning and computational processes (Mustikasari et al., 2017). Therefore, mathematics learning is not merely intended to help students master formulas and computational procedures but also to develop their ability to reason logically, construct valid arguments, draw appropriate conclusions, and solve problems effectively (Amirotunisa & Muinah, 2026). According to the National Council of Teachers of Mathematics (NCTM), mathematics instruction should promote students' conceptual understanding, mathematical reasoning, communication, mathematical connection skills, and problem-solving abilities (Nasution, 2018). Nevertheless, the 2022 Programme for International Student Assessment (PISA) reported that Indonesian students' mathematics achievement

remains below the international average, indicating the need for more innovative instructional strategies capable of improving the quality of mathematics learning (OECD, 2023).

Besides cognitive competence, mathematics learning is also influenced by affective factors, particularly self-confidence. Students with high self-confidence are generally more willing to express ideas, ask questions, participate actively in classroom discussions, and demonstrate confidence when solving mathematical problems. Conversely, students with low self-confidence tend to hesitate when communicating their ideas and often become passive participants during learning activities, which may reduce the effectiveness of the learning process (Andayani & Amir, 2019). Another important competency is mathematical connection skills, which enable students to relate mathematical concepts to one another, integrate mathematics with other disciplines, and apply mathematical knowledge to real-life situations, thereby making learning more meaningful (Siagian, 2016). Along with the rapid development of digital technology, interactive learning media have become increasingly important in supporting these competencies. The use of Canva Quiz provides an attractive learning environment through interactive quizzes, visual presentations, and immediate feedback, allowing students to become more actively engaged throughout the learning process.

The results of interviews conducted with mathematics teachers at SMA Negeri 3 Kota Tegal revealed that students' self-confidence during mathematics learning varied considerably. Some students were still reluctant to express their opinions, lacked confidence when presenting solutions, and hesitated to ask questions when encountering learning difficulties. Furthermore, students' mathematical connection skills had not yet developed optimally, as many students experienced difficulties in connecting mathematical concepts with one another and applying those concepts to contextual problems. These conditions were also influenced by learning practices that remained predominantly teacher-centered, limiting students' opportunities to think independently, discuss ideas collaboratively, and communicate their mathematical reasoning. Consequently, students tended to become passive recipients of information rather than active participants in constructing mathematical knowledge. As a consequence, students tend to become passive recipients of information rather than active participants in the learning process. This condition may reduce students' confidence in expressing mathematical ideas and limit their ability to establish connections among mathematical concepts, resulting in less meaningful mathematics learning.

One instructional approach that can address these problems is the Think Pair Share (TPS) learning model integrated with Canva Quiz. The Think Pair Share model encourages students to think independently, discuss their ideas collaboratively with a partner, and present the results of their discussions to the class. This learning sequence promotes students' active participation while developing communication skills and confidence in expressing mathematical ideas. Previous studies have demonstrated that Think Pair Share effectively improves mathematics learning achievement (Meinalufi et al., 2021). Likewise, (Astuti et al., 2019) reported that integrating Think Pair Share with instructional media significantly enhanced students' mathematics achievement. Furthermore (Zahro et al., 2019) found that Think Pair Share supported by learning media increased both students' classroom participation and mathematics learning outcomes. These findings indicate that Think Pair Share provides an effective cooperative learning environment capable of improving students' engagement throughout mathematics instruction.

The integration of Canva Quiz into the Think Pair Share learning model is expected to create a more interactive and meaningful learning experience. Unlike conventional learning media, Canva Quiz is not only used for assessment but also facilitates the presentation of learning materials, interactive quizzes, and practice exercises in an attractive digital format. The availability of Artificial Intelligence (AI)-supported features further enables teachers to design engaging instructional activities that encourage students to participate actively during every stage of learning. Such integration allows students to construct conceptual understanding independently, collaborate with peers, and receive immediate feedback, thereby supporting both cognitive and affective learning outcomes.

Although numerous studies have investigated the implementation of Think Pair Share or the use of Canva in mathematics learning, research examining the integration of AI-based Canva Quiz into every stage of the Think Pair Share learning model remains limited. Most previous studies have primarily focused on learning achievement, classroom participation, or mathematical thinking skills (Astuti et al., 2019). Similarly, existing studies have rarely examined the simultaneous influence of this instructional approach on both self-confidence and mathematical connection skills. Therefore, this study aims to provide empirical evidence regarding the simultaneous effect of implementing the Think Pair Share learning model integrated with Canva Quiz on students' self-confidence and mathematical connection skills. The novelty of this study lies in the integration of Artificial Intelligence (AI)-based Canva Quiz into

every stage of the Think Pair Share learning process and in the simultaneous evaluation of its influence on cognitive and affective learning outcomes using Repeated Measures MANOVA. Based on this background, the study addresses the following research question: How does the implementation of the Think Pair Share learning model integrated with Canva Quiz affect students' self-confidence and mathematical connection skills in mathematics learning?

2 METHODOLOGY

This study employed a quantitative approach using a pre-experimental method with a one-group pretest-posttest design. This design was selected to analyze the simultaneous effects of implementing the Think Pair Share (TPS) learning model integrated with Canva Quiz on students' self-confidence and mathematical connection skills by comparing their performance before and after the learning intervention. The one-group pretest-posttest design enables researchers to measure changes in the dependent variables following the implementation of the treatment.

The independent variable in this study was the implementation of the Think Pair Share learning model integrated with Canva Quiz, whereas the dependent variables were students' self-confidence and mathematical connection skills.

The study was conducted during the even semester of the 2025/2026 academic year at SMA Negeri 3 Kota Tegal, Indonesia. The population consisted of 356 tenth-grade students. The sample was selected using purposive sampling, resulting in Class X.1, comprising 31 students, being designated as the experimental class. Meanwhile, Class X.3 was used to conduct the instrument try-out to examine the validity and reliability of the research instruments before they were administered to the research sample.

The research instruments consisted of a Self-Confidence questionnaire and a Mathematical Connection Skills Test, both of which fulfilled the required validity and reliability criteria. The research procedure began with administering a pretest to measure students' initial self-confidence and mathematical connection skills. Subsequently, students participated in mathematics learning on the topic of Systems of Linear Equations with Three Variables (SPLTV) using the Think Pair Share learning model integrated with Canva Quiz. At the end of the learning process, a posttest was administered using the same instruments to measure changes in both variables after the implementation of the learning model.



Figure 1. The Canva Quiz interface used in the Think-Pair-Share learning process.

Figure 1 illustrates the Canva Quiz interface used throughout the implementation of the Think Pair Share learning model. The learning media consisted of a main menu, learning materials, interactive quizzes, and practice exercises, all of which were designed to support students during the Think, Pair, and Share stages. The integration of Canva Quiz into each stage of learning was intended to encourage active participation, facilitate collaborative learning, and provide immediate feedback through interactive learning activities.

Data were collected through interviews, documentation, questionnaires, and written tests. Interviews and documentation were conducted to obtain preliminary information regarding the learning process and students' learning conditions, while questionnaires and tests were used to measure the two dependent variables. Before hypothesis testing, the collected data were analyzed using normality and homogeneity tests as prerequisite analyses. The research hypothesis was subsequently tested using Repeated Measures Multivariate Analysis of Variance (MANOVA) to determine whether the implementation of the Think Pair Share learning model integrated with Canva Quiz produced a significant simultaneous effect on students' self-confidence and mathematical connection skills.

3 RESULTS

This study aims to determine the simultaneous effect of implementing the Think Pair Share learning model integrated with Canva Quiz on students' self-confidence and mathematical connection skills. The analysis was conducted using Repeated Measures MANOVA on pretest and posttest data obtained from 31 students in Class X.1 at SMA Negeri 3 Kota Tegal.

Before hypothesis testing, the data were analyzed to ensure that the assumptions required for parametric analysis were satisfied. The normality test indicated that both variables were normally distributed, allowing the data to be analyzed using Repeated Measures MANOVA. Furthermore, descriptive statistical analysis was conducted to provide an overview of the changes in students' scores before and after the implementation of the learning model.

Table 1. Descriptive Statistics

Variabel	Pengukuran	Mean	Standar Deviasi	N
Self Confidence	Pretest	43,323	4,614	31
	Posttest	44,065	3,633	31
Mathematical Connection Skills	Pretest	69,194	21,501	31
	Posttest	82,986	12,650	31

As shown in Table 1, both dependent variables demonstrated an increase in their mean scores after the implementation of the learning model. The mean Self-Confidence score increased from 43.323 in the pretest to 44.065 in the posttest, indicating a slight improvement in students' confidence during mathematics learning. Meanwhile, the mean score for Mathematical Connection Skills increased from 69.194 to 82.968, suggesting a more substantial improvement in students' ability to relate mathematical concepts after participating in the learning activities. In addition, the decrease in the standard deviation of both variables indicates that students' scores became more consistent following the intervention.

To determine whether the observed changes were statistically significant when both dependent variables were considered simultaneously, a Repeated Measures MANOVA was performed. The results are presented in Table 2.

Table 2. Results of the Repeated Measures MANOVA

Statistik	Wilks' Lambda	F	Sig.
Within Subject Effect	0,462	16,904	0,000

The results of the Repeated Measures MANOVA revealed a Wilks' Lambda value of 0.462, an F value of 16.904, and a significance value of 0.000 ($p < 0.05$). Since the significance value was lower than the 0.05 significance level, the research hypothesis was accepted. These findings indicate that there was a statistically significant simultaneous difference in students' self-confidence and mathematical connection skills between the pretest and posttest following the implementation of the Think Pair Share learning model integrated with Canva Quiz.

Overall, the findings suggest that integrating Think Pair Share with Canva Quiz contributed to improvements in both affective and cognitive learning outcomes. The learning activities encouraged students to participate actively in individual thinking, collaborative discussions, and classroom presentations, while the interactive features of Canva Quiz enhanced student engagement throughout the learning process. These findings provide empirical evidence that combining cooperative learning with interactive digital media can positively support mathematics learning.

The results of this study indicate that the implementation of the Think Pair Share (TPS) learning model integrated with Canva Quiz produced a significant simultaneous effect on students' self-confidence and mathematical connection skills. The Repeated Measures MANOVA analysis yielded a Wilks' Lambda value of 0.462, $F = 16.904$, and $\text{Sig.} = 0.000$, indicating a statistically significant difference between students' conditions before and after the learning intervention. These findings suggest that integrating cooperative learning with interactive digital media contributes to improvements in both affective and cognitive aspects of mathematics learning.

Descriptively, the mean score of self-confidence increased from 43.323 to 44.065, while the mean score of mathematical connection skills increased from 69.194 to 82.968. These improvements indicate that the implementation of the Think Pair Share learning model combined with Canva Quiz created learning opportunities that encouraged students to participate more actively during mathematics instruction.

Through the Think stage, students independently analyzed mathematical problems before discussing them with their peers during the Pair stage. The Share stage then provided opportunities for students to communicate and justify their ideas in front of the class. This sequence of learning activities supports students in constructing mathematical understanding while simultaneously promoting confidence in expressing their ideas.

The integration of Canva Quiz into each stage of the Think Pair Share learning process also contributed to creating a more interactive learning environment. Unlike conventional learning media, Canva Quiz was not only used for assessment but also for presenting learning materials, interactive quizzes, and practice exercises. These features encouraged students to remain engaged throughout the learning process and provided immediate feedback that supported conceptual understanding. As a result, students became more actively involved in learning activities, which contributed to the improvement of both learning variables measured in this study.

The findings of this study are consistent with those reported by Yuliandari et al. (2023), who found that implementing Think Pair Share assisted by Canva enhances the quality of classroom interaction and student participation. The present findings also support Rosdianti et al. (2019), who reported that the Think Pair Share learning model contributes positively to the development of students' mathematical abilities. Furthermore, the findings are in line with Andayani and Amir (2019), who emphasized that self-confidence is an important affective factor associated with students' success in learning mathematics. Therefore, integrating cooperative learning strategies with interactive digital media provides meaningful learning experiences that support both cognitive and affective development.

The novelty of this study lies in the integration of an Artificial Intelligence (AI)-based Canva Quiz into every stage of the Think Pair Share learning model. Previous studies generally employed Canva as a presentation or instructional medium, whereas this study utilized Canva Quiz as an interactive learning platform that facilitated the delivery of learning materials, quizzes, and practice exercises throughout the learning process. This integration enabled students to engage more actively in individual thinking, collaborative discussions, and classroom presentations while simultaneously supporting the development of self-confidence and mathematical connection skills. Therefore, this study provides additional empirical evidence regarding the effectiveness of integrating AI-supported digital learning media with cooperative learning models in mathematics education.

4 CONCLUSIONS

This study shows that the implementation of the Think Pair Share learning model combined with Canva Quiz has a significant simultaneous effect on students' self-confidence and mathematical connection skills. The results of the analysis using Repeated Measures MANOVA show a significant difference between the pre- and post-treatment conditions, indicating that the integration of Think Pair Share with Canva Quiz supports a more active, collaborative, and interactive learning process. Furthermore, the increase in the mean scores for both variables suggests that the implementation of this learning model contributes to the development of students' affective and cognitive aspects. Therefore, integrating the Think Pair Share learning model with Canva Quiz can be recommended as an alternative instructional strategy for mathematics learning to foster active participation while improving students' self-confidence and mathematical connection skills.

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