

Canva-Based Microlearning for Conceptual Understanding and Short-Term Knowledge Retention in Vocational Education

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Abstract

This study examines the effect of *Canva*-based *microlearning* on students' knowledge retention in the Basic Vocational Subjects course for tenth-grade students of the Computer and Network Engineering Program at SMK Negeri 4 Bone. This study employed a quantitative pre-experimental approach using a one-group *pretest-posttest-retest* design. The participants consisted of 20 students selected through total sampling. Data were collected using validated and reliable achievement tests and classroom observations. The collected data were analyzed using descriptive statistics, the Shapiro–Wilk normality test, and the paired-samples t-test to determine the effectiveness of the learning intervention. The results reveal that students' learning achievement improved after the implementation of *Canva*-based *microlearning*, as indicated by higher *posttest* scores compared with *pretest* scores. The delayed *retest* also demonstrated a high level of knowledge retention, indicating that most of the acquired knowledge was maintained one week after the learning intervention. Statistical analysis further confirmed significant differences between students' *pretest* and *posttest* scores as well as between *posttest* and *retest* scores, demonstrating the effectiveness of the intervention. The findings of this study suggest that *Canva*-based *microlearning* effectively enhances students' conceptual understanding while supporting short-term knowledge retention through concise, structured, and visually engaging learning materials. These findings provide empirical evidence of the effectiveness of *Canva*-based *microlearning* in promoting sustainable learning outcomes in vocational education.

Keywords: *Canva*-based *Microlearning*; Knowledge Retention; Vocational Education; Digital Learning; Learning Outcomes

1. Introduction

Digital transformation has significantly reshaped the implementation of education across all educational levels, including vocational education. The integration of digital technology into the teaching and learning process no longer serves merely as a supporting tool but has become an essential component in creating more effective, flexible, and student-centered learning experiences. This transformation requires educators to adopt instructional strategies and learning media that align with the characteristics of today's digital generation, ensuring that learning not only enhances students' mastery of subject content but also promotes the retention of acquired knowledge. In vocational education, this need is particularly critical because students are expected to develop strong conceptual understanding as the foundation for mastering the practical skills required in the workplace. Consequently, technology-based instructional innovation has become a strategic approach to improving educational quality while addressing the challenges of twenty-first-century education (Inayati et al. 2025).

Despite the widespread implementation of innovative instructional approaches, students' ability to retain knowledge remains a major challenge in education. Knowledge retention refers to students' ability to recall and apply previously learned information after a certain period of time. High levels of knowledge retention indicate that learning has not only resulted in immediate understanding but has also facilitated the development of durable conceptual knowledge that can be transferred to subsequent learning and real-world problem-solving. Conversely, poor knowledge retention causes students to forget previously learned material more easily, thereby limiting their ability to comprehend more advanced and complex concepts.

These challenges are reflected in Indonesia's educational performance, which continues to face substantial obstacles. According to the Programme for International Student Assessment (PISA), Indonesian students' literacy, numeracy, and scientific literacy achievements remain below the average of OECD member countries. A report published by the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) indicates that only approximately 30%



of students achieved the minimum competency level in reading, 28% in mathematics, and 40% in science. These findings suggest that current instructional practices have not yet been fully successful in fostering long-term understanding. Therefore, improving educational quality should focus not only on students' immediate learning outcomes but also on strengthening their ability to retain the knowledge acquired through the learning process (Kemendikbudristek, 2023).

One of the factors contributing to low knowledge retention is the continued reliance on conventional instructional approaches characterized by information-dense content and limited use of visual learning media that facilitate students' understanding of relationships among concepts. Learning materials presented over extended periods with a predominance of text often increase students' cognitive load, making it more difficult for them to maintain attention throughout the learning process. Consequently, the information received is less likely to be processed effectively and is more easily forgotten after instruction. Hendrizal et al (2025) argued that concise, well-structured learning materials supported by engaging visual elements can significantly improve students' comprehension and retention of instructional content compared with lengthy and monotonous presentations.

A similar issue was identified in the Basic Vocational Subjects course for Grade 10 students in the Computer and Telecommunication Network Engineering (CTNE) program at SMK Negeri 4 Bone. Preliminary observations revealed that many students experienced difficulty explaining previously learned material after the completion of instruction. Some students remained dependent on their notes when responding to questions, lacked confidence in articulating the concepts they had learned, and demonstrated a decline in content mastery when assessments were administered some time after the learning activities had concluded. In addition, the instructional process was still largely dominated by lecture-based teaching and text-heavy presentation media, limiting students' active engagement with the learning materials. These findings highlight the need for instructional innovation that not only facilitates students' understanding during the learning process but also enhances their knowledge retention after instruction has been completed.

One instructional approach with the potential to address these challenges is microlearning. This approach delivers learning content in small, focused units, each designed to achieve a specific learning objective, thereby enabling students to understand, process, and revisit information more effectively according to their learning needs. The concise presentation of learning materials provides students with greater flexibility by allowing them to engage with manageable amounts of information rather than overwhelming them with extensive content in a single session. Shulhani (2025) reported that the implementation of microlearning enhances instructional effectiveness by presenting learning materials in a simpler, more focused, and learner-centered manner that aligns with the characteristics of students in the digital era.

The effectiveness of microlearning can be further enhanced when it is supported by instructional media capable of presenting information in a visually appealing and interactive manner. One platform with considerable potential for this purpose is Canva. Canva provides a wide range of features that enable educators to develop instructional materials in the form of infographics, presentations, educational videos, and other visual resources that are easily accessible to students. Visually designed learning materials not only increase students' engagement but also facilitate a clearer understanding of the relationships among concepts. Yuliana et al (2023) reported that the use of Canva significantly improves students' learning motivation, engagement, and overall learning quality. Similarly, Suparman and Hadi, (2024) found that integrating Canva into vocational high school instruction creates more interactive and engaging learning experiences while enhancing students' conceptual understanding.

Despite these promising findings, previous studies have primarily focused on the effects of microlearning and Canva on learning outcomes, learning motivation, and student engagement. Research specifically examining knowledge retention as an indicator of instructional effectiveness, particularly in Basic Vocational Subjects within vocational education, remains limited. Furthermore, the implementation of Canva-based microlearning in the Computer and Telecommunication Network Engineering (CTNE) program at vocational high schools has received little attention in previous research. This gap highlights the need for further empirical evidence regarding the effectiveness of integrating Canva-based microlearning in enhancing students' knowledge retention beyond the immediate learning process (Corral & Carpenter, 2025).

Based on this research gap, the present study contributes to the existing literature by integrating Canva-based microlearning as an instructional strategy to enhance students' knowledge retention in Basic Vocational Subjects. Unlike previous studies, which have primarily focused on immediate learning outcomes following instruction, this study evaluates students' ability to retain knowledge through a delayed retest administered after a specified interval.

Furthermore, the study was conducted within the context of vocational education, involving Grade 10 students enrolled in the Computer and Telecommunication Network Engineering (CTNE) program at SMK Negeri 4 Bone. Accordingly, this research is expected to provide empirical evidence regarding the effectiveness of Canva -based microlearning in promoting knowledge retention while enriching the literature on digital learning innovations in vocational education.

Therefore, this study aims to examine the effect of Canva-based microlearning on students' knowledge retention in Basic Vocational Subjects among Grade 10 students in the Computer and Telecommunication Network Engineering (CTNE) program at SMK Negeri 4 Bone.

2. Literature Review

2.1 Digital Learning and Microlearning

The rapid advancement of information technology has driven significant transformation in the educational process, particularly through the adoption of digital learning. Digital learning extends beyond the use of technology as a medium for delivering instructional content; it also serves as a means of creating more flexible, interactive, and student-centered learning experiences. By integrating various digital platforms and instructional media, students are provided with opportunities to access learning materials according to their individual learning needs, pace, and characteristics. Consequently, digital learning contributes to improving the quality of the teaching and learning process while facilitating the development of competencies required in the digital era (Inayati et al. 2025).

One of the emerging strategies in digital learning is microlearning, an instructional approach that delivers learning content in small, focused units, each designed to achieve a specific learning objective. Unlike conventional instruction, which typically presents extensive learning materials in lengthy sessions, microlearning enables students to acquire knowledge progressively through concise, easily understandable, and repeatedly accessible content. The presentation of instructional materials in the form of short videos, infographics, digital modules, and interactive quizzes allows students to process information more effectively without experiencing information overload. These characteristics make microlearning well suited to the demands of modern education, which emphasize flexibility, efficiency, and accessibility (Inayati et al. 2025).

The effectiveness of microlearning can also be explained through the Information Processing Theory proposed by Atkinson and Shiffrin (1968, as cited in Herdiani et al. 2023). This theory posits that information received by learners passes through a series of cognitive processes, including encoding, processing, storage, and retrieval within the memory system. Information that receives attention, is processed meaningfully, and is reinforced through repeated exposure is more likely to be transferred from short-term memory to long-term memory. Accordingly, the concise, well-structured, and concept-focused presentation of learning materials characteristic of microlearning enables students to process information more efficiently, thereby increasing the likelihood of achieving stronger knowledge retention.

Based on this perspective, microlearning can be understood as a digital learning strategy that aligns with the principles of information processing and cognitive load management. The integration of concise learning materials, a focus on a single concept, and easy access through digital media enables students to develop conceptual understanding progressively without compromising the quality of learning. Therefore, microlearning is regarded as a promising instructional approach for enhancing learning effectiveness while strengthening students' knowledge retention.

2.2 Canva as a Multimedia Learning Platform

The successful implementation of microlearning depends not only on the strategy used to deliver learning content but also on the instructional media through which the content is presented. One of the platforms widely adopted in digital learning is Canva. As a web-based graphic design platform, Canva offers a wide range of features that enable educators to develop instructional materials in the form of presentations, infographics, short educational videos, educational posters, and other interactive visual resources. Its user-friendly interface and extensive collection of customizable templates enable educators to create learning materials that are engaging, well organized, and easy to understand. These features make Canva a suitable platform for supporting the implementation of microlearning by facilitating the delivery of concise, visually appealing, and systematically organized instructional content that aligns with the principles of microlearning (Inayati et al. 2025).

The use of Canva as an instructional medium is also supported by the Cognitive Theory of Multimedia Learning developed by (Mayer, 2024). This theory suggests that students learn more effectively when information is presented

through a combination of words and relevant visuals rather than through text alone. The use of images, illustrations, icons, animations, and videos facilitates the integration of related concepts, thereby promoting deeper conceptual understanding. However, multimedia instruction should adhere to the principles of simplicity and relevance to avoid imposing unnecessary cognitive load on learners. Therefore, Canva represents an appropriate platform for supporting the implementation of microlearning, as it enables educators to develop concise, visually engaging, and concept-focused instructional materials that emphasize the most essential information.

In this study, Canva served not only as a graphic design platform but also as the primary medium for implementing the microlearning strategy. The instructional materials were developed in the form of infographics, concise presentations, and other visual learning resources designed to facilitate students' understanding of concepts in Basic Vocational Subjects. By presenting information in a clear, engaging, and visually organized manner, these materials were expected to enhance students' attention during the learning process while reinforcing the encoding and long-term retention of knowledge.

2.3 Knowledge Retention

Knowledge retention refers to students' ability to retain, recall, and apply previously acquired knowledge after a certain period has elapsed. The effectiveness of instruction is not solely reflected in students' immediate learning outcomes but also in their ability to preserve and retrieve acquired knowledge when needed. Therefore, knowledge retention is widely recognized as a key indicator for evaluating the effectiveness of an instructional strategy (Herdiani et al. 2023).

According to the Information Processing Theory proposed by Atkinson and Shiffrin (1968, as cited in Herdiani et al. 2023), information received by learners passes through three stages of memory processing: sensory memory, short-term memory, and long-term memory. Information that receives sufficient attention, is processed meaningfully, and is reinforced through repetition is more likely to be stored in long-term memory. In contrast, information processed superficially or without reinforcement is more susceptible to forgetting. From this perspective, successful knowledge retention is influenced by the quality of instructional materials, learners' attention, and opportunities to revisit and reinforce previously learned information.

The characteristics of microlearning, which emphasize concise, well-structured, and concept-focused instructional content, support the information processing mechanisms described by this theory. Furthermore, the use of Canva as a visual instructional medium helps students understand the relationships among concepts by presenting information in a more engaging and accessible format. The integration of these two approaches is expected to increase the likelihood that information will be encoded and stored in long-term memory, thereby improving students' knowledge retention. In this study, knowledge retention was assessed through a delayed retest administered after a predetermined interval to evaluate students' ability to retain the knowledge acquired during instruction.

2.4 Previous Studies and Research Gap

Several previous studies have demonstrated the potential of microlearning and Canva to enhance the quality of teaching and learning. Pebriantika et al (2024) reported that the development of Canva-based microlearning media in the form of smart infographics significantly improved both students' learning motivation and learning outcomes. These findings suggest that presenting instructional content in concise form and supported by visual media creates a more engaging and effective learning experience than conventional instructional approaches.

Similar findings were reported by Hastuti et al (2024) who developed a Canva-based microlearning e-module as the primary instructional medium. Their study demonstrated that the developed learning media achieved high levels of validity and practicality while increasing students' engagement throughout the learning process. Collectively, these studies indicate that integrating microlearning with Canva-based visual media has considerable potential to enhance instructional effectiveness by presenting learning materials in a manner that is more concise, engaging, and easier for students to understand.

Despite these promising findings, most previous studies have primarily focused on improving students' learning motivation, learning outcomes, and engagement. Research that specifically examines knowledge retention as an indicator of instructional effectiveness remains relatively limited, particularly in the context of vocational education. Moreover, the implementation of Canva-based microlearning in Basic Vocational Subjects within the Computer and Telecommunication Network Engineering (CTNE) program has received little attention in previous research. These

gaps highlight the need for further investigation that extends beyond measuring immediate learning outcomes to evaluating students' ability to retain knowledge over time through delayed assessment.

Drawing upon the theoretical framework and previous empirical findings, this study integrates a microlearning strategy with Canva as an instructional medium to enhance students' knowledge retention in Basic Vocational Subjects. The study's primary contribution lies in assessing knowledge retention through a delayed retest administered after a specified retention interval and in examining the effectiveness of this approach among Grade 10 students in the Computer and Telecommunication Network Engineering (CTNE) program at SMK Negeri 4 Bone. Accordingly, this study is expected to provide empirical evidence that contributes to the advancement of digital instructional strategies designed not only to improve immediate learning outcomes but also to strengthen students' long-term knowledge retention in vocational education.

3. Research Method and Materials

This study employed a quantitative approach using a pre-experimental method with a One-Group Pretest–Posttest–Retest Design. This design was selected to examine the effect of Canva-based microlearning on students' knowledge retention by comparing their initial knowledge, learning outcomes immediately after the intervention, and their ability to retain knowledge following a predetermined retention interval. Although the design did not include a control group or random assignment, it enabled the researchers to evaluate changes in learning outcomes and knowledge retention within the same group after the instructional intervention.

The study was conducted at SMK Negeri 4 Bone, Bone Regency, South Sulawesi Province, Indonesia, from March to April 2026. The study population consisted of all Grade 10 students enrolled in the Computer and Telecommunication Network Engineering (CTNE) program, comprising a total of 20 students. Given the relatively small population size, a total sampling technique was employed, whereby all members of the population were included as the research sample. Consequently, the sample size was identical to the population size, with all 20 students participating in the study.

This study involved two variables: an independent variable and a dependent variable. The independent variable was Canva-based microlearning, defined as an instructional strategy that delivers learning content through concise instructional units supported by visual materials developed using Canva. The dependent variable was knowledge retention, defined as students' ability to retain and recall previously learned information after the completion of the learning process. Knowledge retention was measured by comparing students' posttest and retest scores, with the retest administered one week after the instructional intervention.

The research instruments consisted of a knowledge retention test and an observation checklist. The knowledge retention test comprised 20 multiple-choice questions designed to assess two cognitive indicators: recall and recognition. The same instrument was administered during the pretest, posttest, and retest. To minimize testing effects while maintaining equivalent content validity and difficulty, several posttest items were reworded, and the order of questions in the retest was randomized without altering their underlying content or level of difficulty. The observation checklist was used to assess the implementation fidelity of Canva-based microlearning throughout the instructional process.

Before being used in the study, the observation checklist for assessing instructional implementation was validated through content validity using expert judgment by the research supervisors. Meanwhile, the knowledge retention test, which served as the primary research instrument, underwent empirical validity testing using the Pearson Product–Moment correlation and reliability testing using Cronbach's Alpha coefficient. Only items that met the established validity and reliability criteria were included in the data collection process.

The research procedure consisted of three stages: preparation, implementation, and data analysis. During the preparation stage, the researchers obtained research permission, developed Canva-based instructional materials, constructed the research instruments, and conducted validity and reliability testing. During the implementation stage, students first completed a pretest to assess their prior knowledge. The instructional intervention was then delivered using Canva-based microlearning. Upon completion of the learning activities, students completed a posttest to measure their immediate learning outcomes. One week after the posttest, a retest was administered to evaluate students' knowledge retention. In the final stage, all collected data were processed, analyzed, and interpreted to address the research objectives.

Data were collected through tests, observation, and documentation. The tests were administered to measure students' prior knowledge, immediate learning outcomes, and knowledge retention through the pretest, posttest, and retest,

respectively. Observation was conducted to evaluate the fidelity of the Canva -based microlearning implementation, while documentation served as supporting evidence in the form of photographs of classroom activities, attendance records, and other relevant documents.

Data analysis was performed using IBM SPSS Statistics version 25. Descriptive statistics were employed to summarize the data using the mean, minimum value, maximum value, standard deviation, and percentage. Knowledge retention was calculated using the retention index, expressed as the percentage ratio of the retest score to the posttest score. Observation data were analyzed descriptively using percentages to determine the level of instructional implementation. Prior to hypothesis testing, the Shapiro–Wilk normality test was conducted because the sample size was fewer than 50 participants. After the data were confirmed to be normally distributed, the hypothesis was tested using a paired -samples t-test at a significance level of 0.05 to determine the effect of Canva-based microlearning on students' knowledge retention.

4. Results and Discussion

The instrument quality assessment indicated that all test items met the established validity criteria and were therefore considered appropriate for measuring students' knowledge retention. Furthermore, the reliability analysis yielded a Cronbach's Alpha coefficient of 0.942, indicating excellent internal consistency. These findings demonstrate that the research instrument was capable of producing accurate and reliable data for subsequent analyses.

The descriptive analysis revealed a substantial improvement in students' learning outcomes following the implementation of Canva-based microlearning. Prior to the intervention, students demonstrated relatively low levels of prior knowledge, suggesting that most participants had not yet mastered the fundamental concepts related to LAN testers, TCP/IP, IP addressing, and network services. Following the instructional intervention, students' learning outcomes increased markedly, indicating that the implemented instructional strategy effectively enhanced their understanding of the subject matter. Although the retest scores were lower than the posttest scores, they remained considerably higher than the pretest scores, suggesting that students retained a substantial proportion of the knowledge acquired during instruction after a one-week interval.

The improvement in learning outcomes suggests that presenting instructional content through brief, focused learning units facilitates more effective learning. By organizing content into smaller segments, students are able to concentrate on one concept at a time, thereby reducing cognitive load during the learning process and facilitating a clearer understanding of the relationships among concepts. Moreover, the use of Canva as an instructional medium enriched the learning experience through the integration of text, images, icons, colors, infographics, and short videos. This multimodal presentation supported the construction of meaningful mental representations, making information easier to comprehend and remember.

These findings are consistent with the Cognitive Theory of Multimedia Learning, which proposes that learning is more effective when information is presented through complementary visual and verbal channels. The integration of visual elements into instructional materials enables students to organize information more meaningfully, thereby promoting deeper conceptual understanding. The findings also support Cognitive Load Theory, which suggests that presenting information in a concise and well-structured manner reduces unnecessary cognitive load, allowing learners to process information more efficiently.

The analysis of knowledge retention demonstrated that students were able to retain most of the knowledge acquired during the learning process. The high level of knowledge retention indicates that the learned information was not only understood during instruction but also successfully recalled after a one-week retention interval. These findings suggest that Canva-based microlearning not only improves immediate learning outcomes but also promotes the consolidation of knowledge into long-term memory.

These findings can be further explained by the Information Processing Theory, which posits that information receiving sufficient attention, processed systematically, and organized meaningfully is more likely to be stored in long-term memory. The progressive nature of microlearning enables students to process information more efficiently, while the visual presentation afforded by Canva strengthens the encoding process, thereby facilitating both recall and recognition during the delayed retest.

The findings of this study reinforce those reported by Pebriantika et al (2024), Hastuti et al (2024), and Pinandhita and Yasin (2025) who demonstrated that the implementation of microlearning supported by digital media enhances students' conceptual understanding and learning outcomes. However, the present study extends the existing body of knowledge by incorporating a delayed retest administered one week after the instructional intervention to assess knowledge retention. This approach provides a more comprehensive evaluation of the effectiveness of Canva -based microlearning, as it examines not only students' immediate learning outcomes but also their ability to retain acquired knowledge over time. Furthermore, these findings are consistent with those of Corral and Carpenter (2025) who emphasized the importance of assessing knowledge retention as an indicator of more sustainable learning outcomes.

In addition, the observation results indicated that the implementation of Canva-based microlearning was carried out with a high level of instructional fidelity. The high level of implementation demonstrates that all stages of the instructional process were conducted in accordance with the planned instructional design. This finding strengthens the interpretation that the observed improvements in students' learning outcomes and their high level of knowledge retention were attributable to the consistent implementation of the instructional strategy throughout the study.

Overall, the findings demonstrate that Canva-based microlearning has a positive effect on students' knowledge retention in Basic Vocational Subjects. Presenting instructional content in a concise, well-structured format supported by engaging visual media not only enhances students' conceptual understanding during instruction but also facilitates the retention of knowledge after the learning process has been completed. These findings suggest that Canva-based microlearning represents a promising instructional strategy for improving the quality of teaching and learning, particularly in the context of vocational education.

5. Conclusion

This study demonstrates that Canva-based microlearning is an effective instructional strategy for enhancing students' knowledge retention in Basic Vocational Subjects. These findings address the research objective of examining the effect of Canva-based microlearning on students' knowledge retention. Presenting instructional content in a concise, well-structured format supported by engaging visual media enables students to process, understand, and retain information more effectively beyond the immediate learning process.

The primary contribution of this study lies in providing empirical evidence of the effectiveness of Canva-based microlearning in promoting knowledge retention through a delayed retest administered one week after the instructional intervention. This approach offers a more comprehensive evaluation of instructional effectiveness than studies that focus solely on immediate learning outcomes. Consequently, this study contributes to the growing body of literature on the implementation of microlearning in vocational education, particularly with regard to promoting the long-term retention of learning.

From a practical perspective, the findings suggest that Canva-based microlearning can serve as an effective instructional strategy for teachers to present learning materials in a more engaging, well-structured, and accessible manner, thereby improving the overall quality of the teaching and learning process.

Despite these contributions, this study has several limitations. First, it employed a One-Group Pretest–Posttest–Retest Design without a control group, which limits the ability to establish stronger causal inferences. Second, the study involved a relatively small sample drawn from a single vocational school, thereby limiting the generalizability of the findings. Third, knowledge retention was assessed only over a one-week interval. Future research is therefore recommended to employ experimental designs with control groups, include larger and more diverse samples, and extend the retention interval to provide a more comprehensive evaluation of the long-term effectiveness of Canva-based microlearning.

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