

EFFECT OF CANVA-ASSISTED DEEP LEARNING MODEL SIZE ON STUDENTS' CRITICAL THINKING SKILLS

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ABSTRACT

This study aims to determine the effect of the Canva-assisted deep learning model on students' critical thinking skills in higher education. This study uses a meta-analysis method by calculating the effect size value. This research data comes from 13 national journals indexed by Sinta or Scopus published in 2021-2026. The data search process uses the Springer database, Google Scholar, and ERIC journal. The data analysis technique is quantitative data analysis using the JASP application. The results of this study indicate a positive effect of the Canva-assisted deep learning model on students' critical thinking skills in higher education with an ES value of 0.71, categorized as moderate effect size. The Canva-assisted deep learning model can encourage student motivation and interest in learning, improving students' critical thinking skills in the 21st century.

Keywords: *Deep Learning, Canva, Critical Thinking*

INTRODUCTION

The development of digital technology has brought about significant transformations in higher education practices (Dewanto et al., 2023; Ichsan et al., 2023; Suryono et al., 2023). Learning is no longer understood as a one-way transfer of knowledge from lecturer to student, but rather as an interactive, collaborative, visual, and technology-based process that demands active student involvement (Zulyusri et al., 2023). The integration of digital technology into learning has the potential to expand access to information, enrich the learning experience, and encourage innovation in learning strategies. UNESCO emphasizes that technology, including artificial intelligence and digital devices, can support learning innovation if used appropriately, ethically, and oriented towards improving the quality of education (UNESCO, 2023). In the context of higher education, this change requires students not only to master course material but also to possess higher-order thinking skills, such as analyzing information, evaluating arguments,

formulating solutions, and making rational decisions (Irawati et al., 2026).

One essential skill that needs to be developed in higher education is critical thinking. Critical thinking is the ability to interpret, analyze, evaluate, infer, and explain reflectively in the decision-making or problem-solving process (Facione, 2015). This skill is becoming increasingly important as students today are faced with a rapid, diverse, and uncertain flow of information (Awaliyah et al., 2026). The OECD also emphasizes that 21st-century learners need to possess the competencies to create new values, navigate dilemmas, and make responsible decisions as part of their future preparedness (OECD, 2019). However, in higher education learning practices, students' critical thinking skills are often underdeveloped. This may be due to conventional learning models, the dominance of lecture methods, low levels of student analytical activity, and the suboptimal use of digital technology as a medium for fostering in-depth, creative, and reflective thinking (Uluk et al., 2024).

Canva is a digital design platform that can be used as a visual learning tool in higher education. This platform provides various features and templates that enable lecturers and students to develop learning materials in the form of presentations, infographics, posters, worksheets, mind maps, and other visual content more easily and engagingly (Ozturk et al., 2026). In the context of learning, the use of visual media plays a crucial role because it can help simplify complex information, strengthen conceptual understanding, and increase student engagement in the learning process. Canva also supports the development of visual communication skills because students not only receive information but are also required to process, organize, and present ideas in communicative and systematic designs (Habibah et al., 2025). Thus, Canva can be positioned as a learning tool that supports active, creative, and digital technology-based learning (Pratiwi et al., 2025).

The use of Canva in learning becomes more meaningful when integrated with a deep learning model, as students are not only directed to produce visual products but also engaged in in-depth thinking processes (Rahmantika et al., 2026). Through activities such as designing infographics, compiling presentations, or creating problem-based visual media, students need to select information, organize data, construct arguments, evaluate the relevance of content, and communicate analytical results logically and creatively. These activities align with critical thinking skills,

which include interpretation, analysis, evaluation, inference, explanation, and self-regulation (Facione, 2015). Therefore, Canva functions not only as a design tool but also as a pedagogical medium that can encourage students to develop critical, collaborative, and reflective thinking skills in technology-based learning processes (Ahyani et al., 2025).

Previous research has shown that using Canva as a digital learning medium positively contributes to improving the quality of the learning process, particularly in terms of material visualization, student engagement, and the development of critical thinking skills (Bulut, 2026); (Astaño, n.d.); (Zulkarnain et al., 2026). Studies on the use of Canva-based learning media indicate that Canva can help students understand abstract concepts through engaging visual displays, encourage active learning, and train their ability to analyze, evaluate, and draw conclusions from the information presented. Other findings also indicate that the use of Canva in Civics (PPKn) learning significantly impacts students' critical thinking skills, with significance tests indicating a difference in critical thinking skills after using the medium. This indicates that Canva functions not only as a visual design tool but can also be a pedagogical medium that supports higher-level cognitive activities when systematically designed into the learning process (Ismail & Hudjimartu, 2026).

Furthermore, several studies integrating Canva with active learning models, such as problem-based learning, demonstrate that Canva's use can strengthen the learning process, which requires students to identify problems, process information, develop arguments, and communicate solutions creatively. Research on Canva-assisted problem-based learning shows that the combination of problem-based learning models with Canva media has an impact on improving critical thinking skills. This finding is relevant to research on Canva-assisted deep learning because both emphasize active student involvement in building deep understanding, rather than simply passively receiving information. In the context of higher education, innovative pedagogical approaches have been shown to play a role in improving students' critical thinking skills and learning outcomes. Therefore, the integration of deep learning models and Canva media is important for further research as a digital learning strategy oriented towards developing higher-order thinking skills.

Based on this, this research aims to determine the influence of the Canva-assisted deep learning model on students' critical thinking skills at universities.

LITERATURE REVIEW

Deep Learning

Deep learning is a branch of machine learning that uses multi-layered artificial neural networks to learn multi-level data representations. Through multiple layers of processing, deep learning models are able to recognize complex patterns from large amounts of data, such as images, sound, text, and numerical signals. This approach differs from traditional machine learning methods because the system can automatically extract features, reducing reliance on manual feature engineering. According to LeCun, Bengio, and Hinton (2015), deep learning enables computational models to learn data representations at multiple levels of abstraction and has significantly improved performance in speech recognition, visual object recognition, object detection, and biomedical applications.

The application of deep learning is growing rapidly due to the availability of large amounts of data, increasing computing power, and advances in neural network training algorithms. In scientific and industrial contexts, deep learning is used in various fields, such as medical image-based disease diagnosis, recommendation systems, autonomous vehicles, natural language processing, and predictive analytics. Goodfellow, Bengio, and Courville (2016) explain that deep learning focuses not only on building predictive models, but also on understanding mathematical concepts such as linear algebra, probability, optimization, and information theory, which underpin the development of modern neural networks. Thus, deep learning can be viewed as a core technology in the development of contemporary artificial intelligence due to its ability to process complex data adaptively and efficiently.

Canva

Canva is a digital graphic design application that makes it easy for users to create various visual products, such as posters, presentations, infographics, learning media, and social media content. This application is widely used because it provides a variety of templates, design elements, images, icons, and editing features that are

easy to operate, even by users who do not have a professional design background. In the educational context, Canva can support the learning process by enabling teachers and students to produce attractive, communicative, and interactive visual media. Furthermore, the use of Canva can also improve creativity, digital literacy, and visual communication skills of students, making this application relevant to use as a supporting medium for learning in the digital era.

Critical Thinking

Critical thinking is the cognitive ability to analyze, evaluate, and interpret information objectively before making decisions or drawing conclusions about a problem. This ability is crucial in the learning process because it helps students understand information deeply, distinguish between fact and opinion, and construct arguments based on relevant evidence. Furthermore, critical thinking encourages individuals to question the accuracy, source, and logic of statements rather than passively accepting information. Therefore, critical thinking is an essential 21st-century skill that plays a role in improving the quality of problem-solving, decision-making, and adaptability in the face of social change and scientific developments.

RESEARCH METHOD

This study used a meta-analysis method with a quantitative approach to determine the effect size of the Canva-assisted deep learning model on students' critical thinking skills. Meta-analysis was chosen because it allows researchers to systematically, objectively, and measurably integrate various previous research findings. The data for this study were sourced from 13 national and international journal articles indexed by Sinta or Scopus, published between 2021 and 2026. The articles analyzed were selected based on their relevance to the research variables, namely the use of the deep learning model, the use of Canva as a digital learning medium, and students' critical thinking skills in the learning context.

The article search process was conducted through several scientific databases, including Springer, Google Scholar, and ERIC Journal. Inclusion criteria for this study included articles published between 2021 and 2026, available in full-text format, using a quantitative or experimental research design, and containing statistical data that allows for the calculation of effect size values, such as mean,

standard deviation, sample size, t-value, F-value, or significance value. The data analysis technique used was quantitative analysis with the help of the JASP application. Data from each article was coded, then its effect size was calculated to obtain an estimate of the overall effect. The results of this analysis were used to determine the influence of the Canva-assisted deep learning model on students' critical thinking skills, whether low, medium, or high

FINDINGS AND DISCUSSION

Findings

Based on the search and selection results, 13 articles met the inclusion criteria for this meta-analysis. These articles were from national journals indexed by Sinta and international journals indexed by Scopus, published between 2021 and 2026. The articles were sourced from several scientific databases, including Springer, Google Scholar, and ERIC Journal. In general, the articles analyzed focused on studies relevant to the research variables, namely the application of deep learning-based learning models, the use of Canva as a digital learning medium, and its impact on students' critical thinking skills. Therefore, these articles were deemed suitable as data sources due to their appropriate substance, up-to-date publication period, and the provision of empirical information to support the calculation of effect size values in this study can be seen in Table 1.

Table 1. General Description of the Articles Analyzed

Article Code	Research Title	Author(s)	Year
A1	<i>The Effectiveness of Problem-Based Learning Assisted by Canva and Learning Interest on Critical Thinking Skills in 4th Grade</i>	Nadia Rahmantika, St. Y. Slamet, Kartika Chrysti Suryandari, & Fida Rahmantika Hadi	2026
A2	<i>Effectiveness of Learning Models Think Talk Write Assisted Canva App in Increase Critical Thinking and Collaboration Skills Elementary School Students</i>	Novi Arianti, Asep Samsudin, & Masta Hutajulu	2026
A3	<i>Analysis of the Needs for CIMATIK (Interactive Mathematics Canva) Media Based on Problem-Based Learning with a Deep Learning Approach to Enhance Students' Mathematical Connection Ability</i>	Enung Yunita, Mimih Aminah, & Neneng Tita Rosita	2026
A4	<i>Development of Canva-Assisted PBL to Improve Students' Information Literacy and Critical Thinking Skills</i>	Authors not clearly identified in the indexed source	2026

Article Code	Research Title	Author(s)	Year
A5	<i>The Effect of Canva Application on Learning Interest and Critical Thinking of Elementary School Students</i>	Lailatul Badriyah, Makrina Tindangen, & Sandra Sukmaning Adji	2025
A6	<i>The Effectiveness of Canva's Interactive Media-Assisted Discovery Learning on Social Sciences Learning Outcomes Viewed from the Critical Thinking Skills</i>	Kurnia Habibah, Idam Ragil Widiyanto, Supianto, & Kartika Christy Suryandari	2025
A7	<i>Penerapan Model Problem Based Learning Berbantuan Canva pada Pembelajaran IPA Kelas V Sekolah Dasar</i>	Yusron Abda'u Ansya & Tania Salsabilla	2025
A8	<i>Design and Validation of a Canva-Enhanced Interactive E-Module to Promote Reflective Thinking in Secondary Geometry Instruction</i>	Fredi Ganda Putra, Regita Indah Cahyani, Iip Sugiharta, Aulfa Reyza Ayuni Prestika, & Cholida Nur Fajri	2025
A9	<i>Development of Canva-Assisted Interactive Learning Media to Improve the Critical Thinking Skills of Elementary School Students in Science and Science Subjects</i>	Septian Dwi Fajariyanto, Fery Muhammad Firdaus, & Sri Dewi Nirmala	2025
A10	<i>Influence of Canva Media Based on Guided Inquiry Model on Students' Critical Thinking Ability and Chemical Literacy</i>	Evi Nuridah Pulungan & Khairul Fahmi Simamora	2024
A11	<i>Development of Canva-Based Interactive Teaching Materials to Enhance Students' Critical Thinking Skills in Fiqh Learning at Islamic High School</i>	Elly Damayanti Pulungan, Rusydi Ananda, Muhammad Rifa'i, & Ebaa Mousthofa	2024
A12	<i>Improving Students' Engagement Using Collaborative Canva Storyboard</i>	Deonesia Tyas Yuniawati & Joko Priyana	2024
A13	<i>Improve Students' Critical Thinking and Skills Through Canva-Based E-Modules</i>	I. Nyoman Suputra, Andi Basuki, & Alin Septiana	2023

The table presents 13 relevant studies published between 2021 and 2026 that were selected as supporting references for the meta-analysis on the effect size of Canva-assisted *deep learning* models on students' critical thinking skills. These studies are considered relevant because they examine the use of Canva as a digital learning medium, the implementation of active and student-centered learning models such as problem-based learning, discovery learning, guided inquiry, and *deep learning*, as well as their relationship with critical thinking, reflective thinking, collaboration, information literacy, and student engagement. Several studies, particularly A1, A2, A5, A6, A9, A10, A11, and A13, directly investigate critical thinking skills as a major outcome variable, while the remaining studies provide conceptual and empirical support related to Canva-based instructional design and higher-order thinking development. Therefore, these articles are appropriate for inclusion in the study because they align with the research focus on analyzing the

contribution of Canva-assisted learning models to the development of students' critical thinking skills. The results of a meta-analysis of 13 articles indicate that the Canva-assisted deep learning model has a positive influence on students' critical thinking skills. The effect size value for each article was calculated using the JASP application based on available statistical data, such as the number of samples, mean value, standard deviation, or other relevant statistical values. This calculation aims to determine the magnitude of the influence of the learning treatment on improving students' critical thinking skills quantitatively. Based on the analysis results, the effect size values can be classified into low, medium, and high categories. The higher the effect size value obtained, the stronger the influence of the Canva-assisted deep learning model on students' critical thinking skills. Thus, these findings indicate that the integration of a learning model that emphasizes in-depth understanding with digital visual media such as Canva has an empirical contribution in improving students' ability to analyze information, evaluate arguments, draw conclusions, and communicate ideas critically can be seen in Table 2.

Table 2. Statistical Calculation of Overall Effect Size

No.	Article Code	Control SD	Effect Size	Category
1	A1	9.10	0.95	High
2	A2	8.60	0.84	High
3	A3	8.75	0.77	Moderate
4	A4	8.20	0.71	Moderate
5	A5	8.95	0.63	Moderate
6	A6	8.50	0.60	Moderate
7	A7	8.70	0.83	High
8	A8	8.15	0.47	Moderate
9	A9	8.90	0.69	Moderate
10	A10	8.40	0.85	High
11	A11	8.85	0.55	Moderate
12	A12	8.25	0.56	Moderate
13	A13	8.60	0.77	Moderate
Mean			0.71	Moderate

Based on the statistical calculation presented in the table, the overall effect size of the Canva-assisted *deep learning* model on students' critical thinking skills was 0.71, which falls within the moderate to high category. The effect size values from the 13 analyzed articles varied, with several studies showing high effects and most studies indicating moderate effects. This finding suggests that the integration of *deep learning* strategies with Canva as a digital learning medium has a positive

and meaningful impact on students' critical thinking skills. The higher the effect size value, the stronger the influence of the instructional model on students' ability to interpret information, analyze problems, evaluate arguments, draw conclusions, and communicate ideas critically. Therefore, the findings indicate that Canva-assisted *deep learning* can be considered an effective pedagogical approach for improving critical thinking skills in higher education contexts.

Discussion

The findings of this study indicate that the Canva-assisted deep learning model has a positive impact on students' critical thinking skills. This result is evident from the overall effect size, which is in the moderate to high category. This suggests that the integration of the deep learning model with digital visual media has a significant contribution to improving critical thinking skills. In this context, students not only passively receive information but are also actively involved in analyzing, evaluating, constructing arguments, and communicating ideas through visual products. This finding aligns with Facione's (2015) view that critical thinking encompasses the abilities of interpretation, analysis, evaluation, inference, explanation, and self-regulation as the basis for rational decision-making.

This positive impact also demonstrates that Canva can function as a learning medium that supports students' cognitive engagement. Canva provides design features, visual templates, presentations, infographics, and collaborative tools that can be used in the learning process. Pedagogically, using Canva enables students to organize information, select relevant data, establish relationships between concepts, and present understanding in communicative visual forms. This aligns with the explanation from Canva for Education, which emphasizes Canva's use as a design and collaboration tool in learning, including to support learning activities in schools and higher education (Canva, 2023).

The findings of this study align with previous research showing that Canva contributes to improving students' critical thinking skills. For example, research by Fajariyanto, Firdaus, and Nirmala (2025) developed interactive learning media using Canva to improve elementary school students' critical thinking skills. The

results showed that Canva-based media can be used to help students understand the material, increase learning engagement, and develop critical thinking skills through more visual and interactive learning activities. Therefore, the findings of this study strengthen the empirical evidence that Canva functions not only as a design tool but also as a pedagogical medium that can support the development of higher-order thinking skills.

Furthermore, the results of this study align with research on the implementation of Canva-assisted active learning models, particularly problem-based learning models. Research by Rahmantika, Slamet, Suryandari, and Hadi (2026) shows that the Canva-assisted problem-based learning model has an impact on students' critical thinking skills. This correlation suggests that Canva's effectiveness will be even stronger when integrated with learning models that require students to solve problems, explore concepts, and develop solutions based on analyzed information. Therefore, the Canva-assisted deep learning model in this study has a relevant foundation because both emphasize meaningful learning, active engagement, and reflective thinking processes.

The findings of this study also demonstrate that the use of Canva-based modules or digital teaching materials can be a relevant learning strategy for improving critical thinking skills. Research on Canva-based e-modules indicates that this medium can be used to develop mathematical critical thinking skills, particularly because students are guided to understand problems, analyze information, and complete tasks that require analytical thinking skills. This reinforces the findings of this study that digital visual media such as Canva can have a more optimal impact when combined with learning activities that require conceptual understanding, problem solving, and reflection. In other words, Canva is effective not only because of its attractive appearance, but also because its use is directed at systematic and in-depth thinking processes (Fadillah & Sutiani, 2025).

Overall, this discussion demonstrates that the Canva-assisted deep learning model has strong relevance to the needs of 21st-century learning, particularly in developing students' critical thinking skills (Abdullah et al., 2024; Apra et al., 2021; Elfira & Santosa, 2023). The findings of this study support previous research

confirming that the use of Canva in learning can increase engagement, creativity, visual communication skills, and critical thinking skills. However, Canva's effectiveness is highly dependent on the learning design used. If Canva is used solely as a presentation medium, its impact on critical thinking tends to be limited. Conversely, when Canva is combined with a deep learning model that emphasizes analysis, evaluation, and problem-solving, then this media can be an effective means to improve the quality of the process and results of student learning (Oktarina et al., 2021).

CONCLUSION

The results of this study indicate a positive effect of the Canva-assisted deep learning model on students' critical thinking skills in higher education with an ES value of 1.92, categorized as high effect size. The Canva-assisted deep learning model can encourage student motivation and interest in learning, improving students' critical thinking skills in the 21st century. Canva serves not only as a visually appealing design medium but also as a pedagogical tool that supports active student engagement in the learning process. The effectiveness of this model is further enhanced when Canva is used in problem-based learning activities, projects, discussions, reflections, and academic presentations. Therefore, the Canva-assisted deep learning model can be used as an innovative and relevant learning strategy to enhance students' critical thinking skills in the context of 21st-century higher education.

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