

# THE DEVELOPMENT OF CANVA-ASSISTED PROBLEM BASED LEARNING ALGEBRA MEDIA ON JUNIOR HIGH SCHOOL

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## ABSTRACT

Algebra is one of the fundamental topics in mathematics that often poses difficulties for junior high school students, especially in terms of engagement and conceptual understanding. Many students show low interest and motivation in learning algebra, which impacts their problem-solving skills. This study aims to develop Canva-based learning media using a Problem-Based Learning (PBL) approach to address these challenges and enhance students' understanding of algebraic concepts. The method used in this study was Design Research, which consisted of three stages: Preliminary, Formative Evaluation, and Summative Evaluation. The study was conducted at one of the junior high schools in Cianjur Regency. The results of the study showed that the Canva-based learning media developed was effective for use in algebra learning based on the Problem-Based Learning approach, with a success rate of 93% based on expert validation results and student responses through questionnaires. This finding was expected to provide a tangible contribution to the development of interactive digital media to improve the quality of mathematics learning at the junior high school level and to encourage student engagement in the process of mathematical problem-solving. This study recommended the use of Canva-based media as an innovative alternative in mathematics learning, particularly in algebra, and suggested further development for other mathematics topics at the junior high school level.

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## INTRODUCTION

Education is an essential aspect in realizing human capabilities. According to Nelson Mandela, "Education is the most powerful weapon which you can use to change the world." Through education, individuals are taught, guided, and their potentials are developed to produce high-quality human resources. Education today has adapted to the era of the Industrial Revolution 4.0, in which technology plays a crucial role. The world of education cannot be separated from the demands of the times, as digital transformation has become an essential aspect in realizing

learning that is relevant to the needs of the 21st century. Learning in the 21st century requires a shift from conventional methods toward approaches that utilize technology (Fasa & Purwanti, 2023).

In line with the spirit of the *Merdeka Curriculum*, which emphasizes meaningful and student-centered learning, innovation in learning media and approaches is needed to foster active engagement and deep understanding, rather than mere memorization. In the process, all subjects can be enhanced through the integration of technology in teaching, as in the case of mathematics learning, which in practice is still perceived by some students as an abstract discipline, filled with various symbols and formulas that are difficult to understand (Aliya et al., 2024).

One of the topics that often becomes a challenge at the junior high school level is algebra. Many students experience difficulties in connecting algebraic symbols and representations with real-life situations, which affects their motivation and learning outcomes (Marbun et al., 2025). In fact, algebra covers essential competencies, such as understanding algebraic forms, performing algebraic operations, constructing and solving equations, as well as applying them in everyday problem-solving. Paridjo (2018) thought that algebra could be regarded as the capacity to represent quantitative situations; thus, the relationship between variables and something unknown becomes visible, and to formulate relationships among quantities and construct the concept of variables. All of this requires not only procedural skills but also deep conceptual understanding.

One of the main causes of the failure in learning algebra at the junior high school level is the instructional approach that overly emphasizes procedural aspects without being accompanied by conceptual understanding, as stated by (Hamid, 2025). In practice, many students are taught to memorize the steps for solving problems without truly understanding the meaning of symbols, variables, and the relationships among the underlying concepts. This leads to students having difficulties in applying their algebraic knowledge to other contexts, as well as failing to develop symbolic and abstract thinking skills. As stated by Hilmi et al. (2018) many students still only memorize formulas and problem-solving steps without understanding the underlying concepts, making them easily forget and confused when the problems are modified from the forms they are familiar with. In addition, the weak connection between algebra material and real-life contexts further worsens the situation. Students often fail to see the relevance of algebra in everyday life, making the learning process feel unfamiliar and meaningless. According to Febriansyah (2016), the cause of students' learning difficulties is their struggle to identify variables, coefficients, and determine problem solutions, due to the presentation of material that tends to be abstract and distant from students' daily experiences. This lack of connection leads to low interest and engagement among students during the learning process.

In addition to the lack of contextual approaches, the limited use of interactive visual media is also a serious obstacle in the learning process. Many teachers still rely on lectures and writing on the board without involving learning media that can help students concretely visualize mathematical ideas. In fact, according to Mardianto & Prayitno (2020), "Learning media plays a significant role in facilitating an effective mathematics learning process." Student learning motivation is also a determining factor in the success of learning; thus, "students' interest in learning can be increased by selecting appropriate media according to the environmental conditions, thereby achieving learning objectives." (Mu'minah, 2021). When students perceive the material as too difficult, uninteresting, and irrelevant to their lives, their motivation to learn decreases. In the study by Aliya et al. (2024) it was found that "students' learning motivation has a significant impact on improving their achievement in certain subjects."

One relevant approach is Problem-Based Learning, which encourages students to think critically, develop skills in group work, solve contextual problems, and construct knowledge

through active learning experiences (Fariana, 2017). The collaboration of problem-based learning, deep learning, and visual media in learning can create relevant, in-depth, and engaging instruction. Thus, teachers can use interactive and creative learning media in designing instruction.

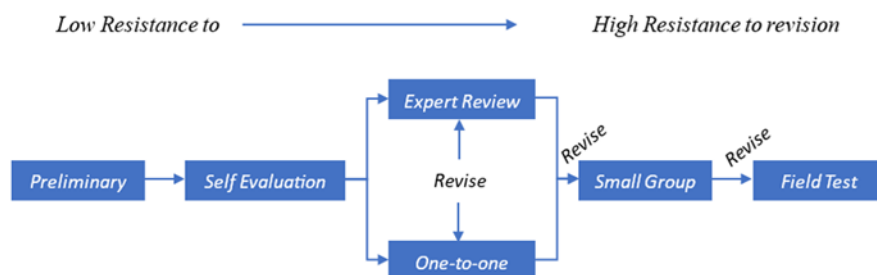
Canva, as a visual-based digital design platform, offers great potential for creating engaging, interactive, and user-friendly learning media for both teachers and students. The Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) also recommends the Canva for Education application as evidence that the government supports the improvement of education quality in Indonesia. The use of technology in learning certainly has limitations in students' creative processes, and this becomes a challenge for educators to enhance students' creativity (Ratih & Yanuartuti, 2021). Several studies have shown that creatively designed visual learning media can help students understand abstract concepts and increase learning engagement (Purnama et al., 2024). According to Supradaka (2022), if one wishes to have a high-quality design but does not yet possess adequate skills, Canva emerges as an effective solution. According to Nurhayati & Langlang Handayani (2020) the use of media in learning brings a significant positive impact and is beneficial for student development. Nevertheless, there are still few studies that explicitly integrate the use of Canva within the problem-based learning model to promote deep learning, especially in algebra material, which continuously demands conceptual and symbolic understanding for further development. There remain unanswered questions about how interactive visual media can be effectively used to facilitate meaningful learning in mathematics, particularly algebra at the junior high school level.

Based on these problems, this study was conducted to develop Canva-based learning media within the problem-based learning approach that supports the achievement of deep learning in algebra material, and to identify the development process of the Canva learning media, the feasibility of the developed media, its effectiveness, and the challenges encountered during the development of Canva media. This study hypothesizes that the use of Canva learning media in the context of PBL can improve the effectiveness of junior high school students' algebra learning, in terms of conceptual understanding, problem-solving ability, and learning motivation. Based on the results of interviews with mathematics teachers at the research site, it can be stated that students' abilities are still relatively low, particularly in the learning process. In line with this, it was also found that some students still do not understand the lessons delivered by the teacher, and students tend to perceive mathematics as a difficult subject, which ultimately leads to mathematics being disliked by students. The aforementioned conditions result in the students' average scores being below the Minimum Mastery Criteria (KKM).

Therefore, based on the explanation above, the author is interested in researching the development of Canva learning media. This study is expected to provide both theoretical and practical contributions to technology-based mathematics learning innovation that is not only visually engaging but also capable of fostering the deep learning required in the 21st century, as explained by Tuni'mah et al. (2024), namely "*a means to develop both theory and practice by systematically designing, implementing, and refining educational interventions in real classroom settings.*"

## **METHOD**

This study was a development study using the Design Research approach with an evaluation model adapted from Tessmer (Akker et al., 2013), which includes the stages of Preliminary Evaluation and Formative Evaluation. The research subjects were seventh-grade students at one of the public junior high schools in Cianjur Regency.



**Figure 1.** Stages of Formative Evaluation

The Preparation Stage (preliminary) is the stage in a study commonly referred to as the needs analysis. At this stage, the researcher reviewed relevant literature, including articles related to Canva media in the context of algebra material. In addition, an analysis was conducted on the characteristics of the students who became the research subjects, namely seventh-grade students at one of the public junior high schools in Cianjur Regency where this study was conducted. This study also determined algebra material that suited the relevant needs to be taught. The Design Stage (preliminary) was the stage of preparing the design of the Canva learning media, which included the Competency Achievement of Phase D in the algebra element, the Learning Objectives Flow following the Competency Achievement of Phase D in the algebra element, as well as the assessment instruments for media expert validation, material expert validation, and student responses, all aligned with deep learning.

At the Formative Evaluation stage, validation and revision were carried out through five sub-stages: Self Evaluation, Expert Review, One-to-One, Small Group, and Field Test. The Self-Evaluation stage involved evaluating the research instruments that had been developed during the design stage and making improvements based on the findings from the evaluation results. The outcome of the evaluation at this stage was then referred to as Prototype 1. The Expert Review stage (Formative Evaluation) involved having Prototype 1 evaluated by experts following the framework by Tessmer (1993). The expert validation process included assessments of content feasibility, language, and presentation aspects. The results of this validation were then used to revise Prototype 1.

The One-to-One stage was conducted after the revision process of Prototype 1 was completed. In this stage, interaction was carried out with three seventh-grade students from Class VII-A at one of the public junior high schools in Cianjur Regency, with varying levels of cognitive ability: low, medium, and high. These students were asked to freely provide input and suggestions after they finished viewing and reading the entire learning media. The validation results of Prototype 1 were revised based on the expert review and one-to-one stages. After undergoing a revision process based on feedback from experts and students in those stages, the revised prototype was designated as Prototype 2. Therefore, Prototype 2 could be considered a valid instrument.

The Small Group stage was conducted in Class VII-E at one of the public junior high schools in Cianjur Regency by six students with varying levels of cognitive ability: low, medium, and high. Prototype 2, which had been declared valid, was tested to evaluate the feasibility and practicality of the Canva learning media. If students were able to understand the instructions in the Canva learning media well based on the results of the small group trial, then the Canva teaching material could be considered feasible. In addition, based on student responses as well as the input and suggestions they provided regarding Prototype 2, these results were used to revise Prototype 2. This aimed to produce Prototype 3, which was not only valid but also feasible for use.

The Field Test stage was the stage of field trials conducted in Class VII-B at one of the public junior high schools in Cianjur Regency, which was the research subject. This stage aimed to evaluate the feasibility of the Canva learning media in the context of direct classroom use, referring to the results of student response questionnaires as well as the input and suggestions they provided. The results of the student response questionnaires served as the main reference to measure the level of feasibility and practicality of using the Canva media. In addition, the input and suggestions submitted by students were used to revise the Canva media, with the goal of making the Canva media the final prototype.

The questionnaire method used aimed to measure student responses after the learning process using Canva teaching media. The questionnaire instrument included student satisfaction with the media used and student interest in the visual appearance presented in the Canva learning media. The data collected in this study were processed using Microsoft Excel through descriptive statistics. Descriptive statistics were used to demonstrate the development process and the challenges encountered during the development process. Through this analytical process, answers to the existing problems would be identified. The results of this data analysis represent the final outcome of expert validation of the teaching material assessment. The analysis of expert group validation results was based on a Likert scale. The percentage of the validation results was calculated using the following formula:

$$\bar{x} = \frac{\sum x}{n}$$

With the following representation:  $\bar{x}$  represents the average score,  $\sum x$  is the total score of each evaluator, and  $n$  is the number of evaluators. The average result was then converted into a percentage using the following formula:

$$\text{Assessment Result} = \frac{\text{total score obtained}}{\text{maximum score}} \times 100\%$$

The feasibility test criteria according to Arikunto (Ernawati, 2017) are presented in Table 1.

**Table 1.** Feasibility Criteria

Criteria	Score
Very unfeasible	<21%
Unfeasible	21% – 40%
Fairly feasible	41% – 60%
Feasible	61% – 80%
Very feasible	81% – 100%

The feasibility test criteria can be seen in Table 1, which includes five criteria: the category with the interpretation of *very unfeasible*, indicated by a score of less than 21%, where the product is interpreted as not usable; *unfeasible*, with a score ranging from 21% to 40%, where the product can be used with major revisions; *fairly feasible*, with a score of 41% to 60%, interpreted as a product that can be used with several revisions; *feasible*, with a score of 61% to 80%, meaning the product can be used with minor revisions; and *very feasible*, with a score of 81% to 100%, meaning the product can be used without any revisions.

## RESULTS AND DISCUSSION

### *Results*

This study aimed to develop Canva-based learning media within the Problem-Based Learning approach for algebra material at the junior high school level. The development process was carried out using the Design Research approach, which included the stages of Preliminary Evaluation and Formative Evaluation, as described below:

At this stage, the researcher conducted a needs analysis by carrying out field observations to determine whether the learning media needed to be developed. In this stage, the researcher reviewed relevant literature, including articles related to Canva media in the context of algebra material. In addition, an analysis was conducted on the characteristics of the students who were the research subjects, namely seventh-grade students at one of the public junior high schools in Cianjur Regency. Based on the learning observations, it was found that students still experienced difficulties in understanding mathematical problems and showed a lack of interest in learning, as they had not yet understood the concepts of the material being delivered. As a result, the learning outcomes achieved were unsatisfactory, with students scoring below the Minimum Mastery Criteria (KKM).

One of the influencing factors was the learning media used in the teaching, which was still in the form of conventional teaching materials, consisting only of text without images and with an unappealing appearance. This was supported by the analysis of the comprehension process and evaluation from the perspective of visual presentation and user interaction. Based on an interview with one of the teachers at the junior high school, it was found that the learning process still relied on media derived from a single source and had not yet met the students' needs. During the observation, it was found that students showed interest in ICT (Information and Communication Technology)-based learning. Students were attracted to examples presented through images from daily life, making it easier for them to understand abstract examples.

This study also determined algebra material that was relevant to the needs and appropriate for instruction. At this stage, the researcher also prepared the design of the Canva learning media, which included the Competency Achievement of Phase D in the algebra element, the Learning Objective Flow aligned with the Competency Achievement of Phase D in the algebra element, as well as assessment instruments for evaluating product quality by media experts, content experts, and student responses accordingly.

The learning media included the title of the teaching material, namely *Algebraic Elements Worksheet*, and the subject matter to be studied, which was Algebra. In this study, the researcher developed learning media for four meetings. The media also contained instructions for use and an exploration of features to make the learning process more interactive and allow students to be directly involved in using the media. The media presented learning objectives and a stimulus in the apperception stage, followed by the five stages of Problem-Based Learning, namely: orienting students to the problem, organizing students for learning, individual or group investigation, developing and presenting results, and analyzing and evaluating the problem-solving process. In the stage of orienting students to the problem, students could attempt to identify and understand the problem by observing the pages in the provided media and trying to explore changes in the images within the media. With the assistance of the Canva learning media, student enthusiasm increased, and students could be easily guided to understand and find solutions to problems in algebra material, enabling them to solve mathematical problems. The media display before validation is shown in the figure below:



**Figure 2.** Initial Display of the Media



**Figure 3.** Feature Options Display in the Media



**Figure 4.** Stimulus Display Before Validation

*Formative Evaluation Stage.* At this stage, the researcher carried out evaluations and improvements based on the findings, which were then developed into Prototype 1. This was followed by the validation stage by media experts and content experts. The media validation instrument consisted of 20 assessment items categorized into four aspects: display feasibility (8 items), alignment with learning objectives (4 items), creativity and innovation (3 items), and design aspect (5 items). The media expert validation was conducted by three validators. The validity results from the content experts and media experts are presented as follows:

**Table 2.** Recapitulation of Media Expert Validation Results

No	Aspect	Percentage	Description
1	Display feasibility	90.8%	Very Feasible
2	Alignment with learning objectives	96.6%	Very Feasible
3	Creativity and innovation	91.1%	Very Feasible
4	Visual design aspect	94.6%	Very Feasible
	Total	93.32%	Very Feasible

The media validation instrument consisted of 20 assessment items categorized into four aspects: display feasibility (8 items), alignment with learning objectives (4 items), creativity and innovation (3 items), and visual design aspect (4 items). The media expert validation was conducted by three validators. The recapitulation of media expert assessments, as shown in Table 2, resulted in a score of 90%, which, when adjusted to the feasibility test criteria in Table 1, indicates that the developed media is considered very feasible for use in the learning process.

**Table 3.** Recapitulation of Content Expert Validation Results

No	Aspect	Percentage	Description
1	Content feasibility aspect	94.44%	Very Feasible
2	Language feasibility aspect	92.00%	Very Feasible
3	Relevance of teaching material to related elements	96.00%	Very Feasible
4	Relevance of concept discovery elements	95.00%	Very Feasible
Total		94.36%	Very Feasible

The content validation instrument consisted of 28 assessment items categorized into six aspects, namely: content feasibility aspect (8 items), language feasibility aspect (7 items), learning material presentation aspect (4 items), alignment with the learning approach aspect (2 items), concept discovery element aspect (4 items), and alignment of the student worksheet (LKPD) with the approach aspect (3 items). Based on the results of the content validation assessment, a percentage of 94.36% was obtained, which, when adjusted to the feasibility test criteria, indicates that the content expert validation result is classified as *very feasible*. The following is the revised media display after validation by the expert:



**Figure 5.** Stimulus Display After Validation

The recommended revision was to relocate the "Next" button from its original position at the bottom to the top right corner. This adjustment was made to prevent the button from being obstructed by the bottom display bar when clicked.

After the validation by content experts and media experts, interactions were conducted with three students from Class VII-A to obtain open-ended responses based on their opinions. The sample was selected to represent variations in cognitive ability levels: high, medium, and low. After the revision process based on feedback from experts and students at this stage, the improved prototype was designated as Prototype 2. Therefore, Prototype 2 could be considered a valid instrument. A small group trial was then conducted involving six students from Class VII-B with cognitive ability levels ranging from low, medium, to high. If students were able to understand the instructions in the Canva learning media well based on the results of the small group trial, then the Canva teaching material could be considered feasible. This was aimed at

producing Prototype 3, which was not only valid but also feasible for use. The final stage was the Field Test, in which a field trial was conducted in Class VII-B. This stage involved evaluating the feasibility of the Canva learning media in the context of direct classroom use, referring to the results of student response questionnaires. The results of these questionnaires served as the measure of the feasibility and practicality of the Canva media, with the goal of making the Canva media the final prototype.

**Table 4.** Recapitulation of Student Responses to the Learning Media

No	Aspect	Percentage	Description
1	Usefulness Aspect	87.14%	Very Feasible
2	Ease of Use Aspect	89.29%	Very Feasible
3	Assistance Aspect	90.71%	Very Feasible
4	Attractiveness Aspect	88.81%	Very Feasible
Total		88.99%	Very Feasible

Based on Table 4, the results of student responses to the developed learning media indicated that it was very feasible, with a percentage of 93.32%. The assessment included the usefulness aspect at 87.14%, the ease of use aspect at 89.29%, the assistance aspect at 90.71%, and the attractiveness aspect at 88.81%.

### **Discussions**

Students' understanding of algebra material at the junior high school level remains one of the main challenges in mathematics learning. Many students experience difficulties in understanding abstract algebraic concepts, such as the use of variables, operations on algebraic expressions, and the application of equations in real-life contexts. Based on previous research findings, students' low learning outcomes are influenced by the perception that mathematics is a difficult and intimidating subject. This perception affects students' low learning motivation, even though learning motivation is a significant aspect (Aliya et al., 2024)

One of the main factors causing the learning objectives not to be achieved is the lack of students' conceptual understanding. A learning process that focuses solely on delivering formulas and practice problems without explaining the meaning of the symbols and procedures used leads students to memorize rather than understand. This issue is exacerbated by the lack of visual media that can help students form mental representations of these abstract concepts. Students also experience difficulties in connecting algebra material with real-life situations because the delivery of the material tends to be non-contextual and distant from their daily experiences. Contextual learning, according to Rubiyanto & Haryanto (2010), is a learning concept that helps teachers relate the material being studied by students to real-life situations and can encourage students to make connections between the knowledge they possess and its application in everyday life. In addition, students' learning motivation is also low because they perceive the material as difficult, uninteresting, and irrelevant.

Students tend to be more passive, relying solely on the teacher's instructions, and are not accustomed to learning approaches that require active involvement. Learning is still generally dominated by lectures and written assignments, without providing space for students to explore problems independently or collaborate in groups.

To address this issue, Canva-based learning media was developed and integrated into the Problem-Based Learning approach. This media development was designed to present algebra material in a visual, interactive, and contextual manner, as well as to provide space for students

to think critically, solve problems, and present their learning outcomes. According to Mutmainnah (Gulo & Harefa, 2022), interactive learning media offers many opportunities to encourage students to give positive responses and to be directly involved in the learning process. The media design stages began with a needs analysis based on field observations and interviews with teachers and students, followed by the formulation of Learning Outcomes (Capaian Pembelajaran; CP), Learning Objectives Flow (Alur Tujuan Pembelajaran; ATP), as well as the content and layout design using the Canva platform. The material was structured to cover four meetings, following the stages of PBL, which included stimulus, problem introduction, exploration, discussion, presentation, and reflection.

At the development stage, a validation process was conducted by content experts and media experts to ensure that the media developed was feasible for use in learning. The content expert validation assessed aspects such as content, alignment with the curriculum, integration with the problem-based learning model, and language use. Meanwhile, the media expert validation assessed aspects such as visual design, layout, readability, and ease of use. The validation results indicated that the developed media received the category of "very feasible," both in terms of content and appearance. This is in line with the findings of Aeni (2024), which showed that the results of media and material validation were categorized as valid.

However, several challenges were encountered during the development process. First, students experienced difficulties in adapting to active learning patterns due to their familiarity with conventional models. They were not accustomed to working in groups, organizing ideas independently, or presenting their work. Second, there were technical obstacles such as unequal access to digital devices and internet connectivity among students. Third, there were challenges in forming effective learning groups, where differences in ability among group members led to unequal contributions.

Although several obstacles were encountered, the development results showed that the use of Canva-based visual media in algebra learning with the Problem-Based Learning approach could enhance students' conceptual understanding, build their engagement in the learning process, and create more meaningful learning. Therefore, this media is not only an innovative alternative but also a concrete solution to overcoming obstacles in mathematics learning at the junior high school level. This is in line with the findings of Azzahra et al. (2023), which demonstrated an improvement in senior high school students' mathematical understanding through the use of a Canva-assisted Problem-Based Learning model.

## **CONCLUSION**

This study successfully developed Canva learning media integrated into the Problem-Based Learning (PBL) approach for algebra material at the junior high school level. The media was designed to address the challenges of low student interest, engagement, and conceptual understanding of algebra material. Validation results from content and media experts indicated that the developed product falls into the "very feasible" category. Student responses to the media were also highly positive, indicating increased learning interest, understanding, and active engagement during the learning process.

The use of Canva media in problem-based learning has proven effective in helping students understand algebraic concepts more concretely and contextually. This media supports critical, collaborative, and exploratory thinking processes in accordance with the characteristics of the Problem-Based Learning approach. In addition, it is also capable of bridging the gap between the delivery of abstract material and students' everyday learning experiences through engaging and interactive visualizations. Although the development process encountered several obstacles, the overall process demonstrated that this learning media is not only feasible but also has a positive effect on the quality of mathematics learning.

Thus, Canva learning media within the Problem-Based Learning approach is recommended as an innovative alternative in mathematics learning, particularly for algebra material at the junior high school level. Further development can be carried out for other mathematics topics to expand the positive impact of integrating technology and contextual approaches in education.

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