

Application of Canva in Learning Spatial Geometry According to the Project Based Learning Model

Meristra Mionita Pangalila¹, Santje M. Salajang², Victor Sulangi³

¹Master of Mathematics Education Study Program, Manado State University Postgraduate Program
Email: pmeristra[at]gmail.com

²Master of Mathematics Education Study Program, Manado State University Postgraduate Program
Email: santjesalajang[at]unima.ac.id

³Master of Mathematics Education Study Program, Manado State University Postgraduate Program
Email: victorsulangi[at]unima.ac.id

Abstract: *This article contains a report on research results regarding the application of the Project Based Learning (PjBL) model which applies the Canva online graphic design platform in terms of the level of understanding, interest and motivation of students in learning the concept of Geometry and Building Space in class 7. The main problem that motivates the implementation of research is the learning atmosphere in geometry classes which tend to be less interesting for students and end up with low learning outcomes. Currently, Information and Communication Technology (ICT) is developing which has an impact on the use of learning facilities that need to be adapted. One widely used platform is Canva; an online graphic design platform that allows users to easily create beautiful presentations. The use of this platform in learning Spatial Geometry using the Project Based learning model is strongly suspected to have a significant influence on increasing students' understanding, interest and motivation. The research was conducted using an experimental pre - test and post - test control group design method to test 2 (two) hypotheses. The research results show that the application of the PjBL learning model supported by the Canva platform is more effective in increasing students' understanding, interest and motivation in learning Spatial Geometry.*

Keywords: Online platform, Canva, PjBL learning model, Spatial Geometry

1. Preliminary

Mathematics education is an important foundation in developing human potential at various levels of education. In the educational context involving teaching staff and students, mathematics is not only related to knowledge of counting or memorizing formulas, but also training critical and logical thinking skills through analysis. Through systematic analysis, students learn to apply formulas and steps and understand basic mathematical concepts in depth. This not only enriches students' mathematical knowledge but also develops problem - solving skills that are useful in everyday life. However, in practice, there are significant challenges in learning mathematics, especially in geometric material in grades 7 and 8. It was found from the results of giving daily tests and daily assignments that, on the same problems, children showed incorrect answers. So this difficulty shows that there are weaknesses in the learning approach used, which has an impact on low student learning outcomes. One learning model that can be used to increase learning effectiveness is the project - based learning model (PJBL). The advantages of this model are: 1) Providing learning opportunities for students to develop according to real world conditions; 2) Involving students in learning to collect information and apply that knowledge to solve problems in the real world; 3) make the atmosphere fun. Meanwhile, the weaknesses of this learning model are: 1) It requires skilled teachers who are willing to learn; 2) Requires adequate facilities, equipment and materials; 3) Difficulty involving all students in group work (Sutrisna, et al, 2019). At this time, in the era of development of information and communication technology (ICT), the use of tools in learning has become very important. One tool that is widely used is Canva. Using Canva in mathematics learning

can help students understand the material better through interesting and interactive visualizations. In the context of learning geometric shapes in grade 7, using Canva in the PJBL model can be an innovative solution to overcome the problem of students' low understanding of the properties of geometric shapes and problem analysis. By utilizing Canva, students can express their understanding creatively and visually, which can increase their interest and involvement in the learning process. The benefits that can be obtained from Canva media are 1) Exploring Creativity 2) Interesting Teaching Material 3) Class Collaboration 4) Time Efficiency. Based on this background, the researcher chose the title "Application of Canva in Learning Geometry and Spatial Structures According to the Project Based Learning Model". The formulation of the problem in this research is: (1) Can the application of the Canva - based project learning model (PJBL) in learning geometric figures 7 improve students' understanding? (2) Are there significant differences in students' interest, motivation and results in learning spatial geometry using the Canva PJBL model and the conventional method PJBL model? And the objectives of the research are: (1) Assessing the extent to which the implementation of the Canva - based PJBL model can improve students' understanding of the concepts and properties of spatial structures. (2) Comparing the level of student interest and motivation in learning spatial geometry when using the Canva - based PJBL model with when using conventional methods. (3) Measuring the effectiveness of the Canva - based PjBL model in increasing student learning motivation compared to conventional methods. Canva provides various intuitive features and tools, making it suitable for use by various groups, both professionals and beginners. Some of Canva's main features, which can be obtained from the official website

and reviews from various existing blogs, include hundreds of ready - to - use templates for various purposes, including posters, banners, invitations, business cards, social media, presentations, and many more.

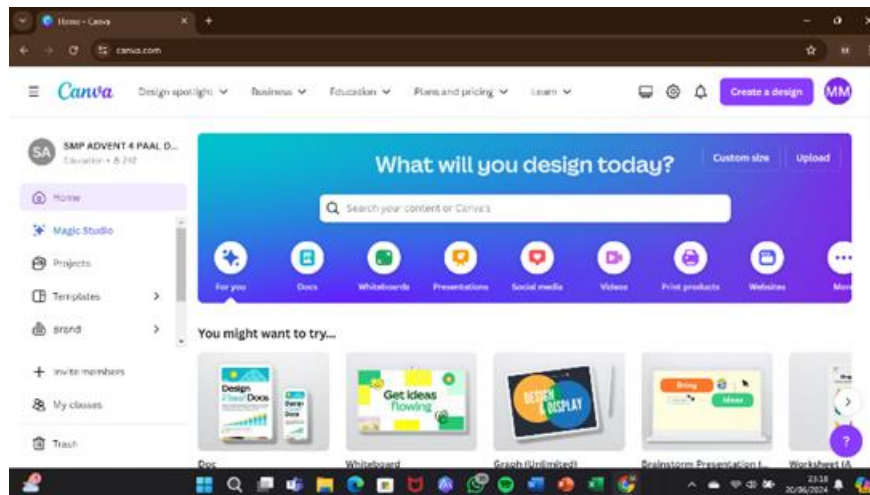
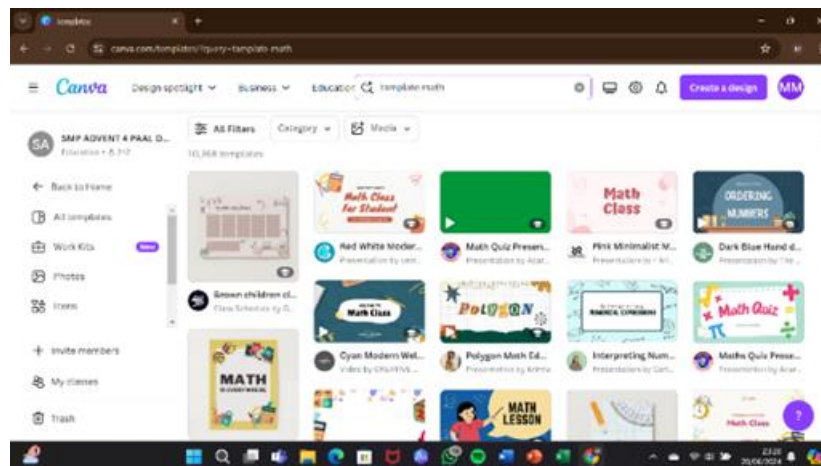


Figure 1.1: Canva's main features on the official website

Users can access a large collection of images, icons, illustrations and other design elements from Canva's Media Library. This allows users to add interesting images to their designs without having to look for images elsewhere.



Gambar 1.2: Perpustakaan Media Canva

Easy - to - Use Design Tools: Canva's interface is designed to be easy for anyone to understand and use. Users can quickly adjust the text, color, size, and layout of their designs using the available tools. **Customization Features:** Canva allows users to completely customize designs to suit their needs and preferences. Users can make various adjustments such as changing fonts, setting colors, adding effects, and more. **Team Collaboration:** According to Yilmaz & Cagiltay (2020) that "Canva acts as a collaborative platform that makes it easier for students and teachers to carry out collaborative projects in the context of project - based learning". Users can invite their team members or friends to collaborate on designs. This feature facilitates mutual collaboration and exchange of ideas during the design process. **Cloud Storage:** Canva provides cloud storage for users to store and access their designs from anywhere and at any time. Users can also download these designs in a variety of different file formats. **Various Output Options:** After completing the design, users can download it in image format (JPEG, PNG), document format (PDF), or presentation format (PowerPoint). Canva also provides the option to print designs directly or share them online. There are several benefits of Canva for Education that users can

enjoy, namely (Directorate of Middle School Development.2021): Exploring the creativity of educators and students in the teaching and learning process, creating interesting learning materials (teaching materials) so as to encourage better learning outcomes, through Collaboration in class increases self - confidence and trains students' critical thinking patterns, helps educators save time in creating teaching materials in visual format (images), assists education staff in creating school promotional materials and educational reports. Canva can foster students' enthusiasm for creating and encourage them to understand and obtain information quickly (Abdulla, 2024). The integration of Canva in PjBL learning refers to the use of an online design platform in order to create interesting discussion of material so that it is easily absorbed by students. Some of the main concepts of Canva integration in PjBL learning that researchers obtained are Material design and the existence of Reciprocity. According to Larmer, et al (2015), Project Based Learning is a dynamic teaching approach. They work in collaborative groups, develop communication skills, and learn problems, critical thinking and creativity because they have to find solutions to their project challenges (Ginanjar, et al.2021). Project - based

learning is a teaching model that emphasizes giving assignments, especially in the form of projects that can direct students to conduct inquiry learning (Hamida, et al., 2020). Based on the definitions above, it can be concluded that Project Based Learning is a learning model that solves a problem with project - based solutions. In Project Based Learning, students work actively in groups or individually to understand and solve certain topics through projects that they design, implement, and present and students can also explore real world problems, encouraging students' active involvement in learning so that they can improve development of critical, creative and innovative thinking attitudes. Suciani, et al., 2018 stated that the PjBL principles quoted from Wena (2013) are the principle of centralization, the principle of focusing on questions or problems, the principle of constructive investigation or design, the principle of autonomy, the principle of realistic. These five principles are: Centered Principle, principle of focusing on the Question or Problem, principle of Constructive Investment and Design, autonomy principle, realistic principle. The relationship that can be obtained between PjBL, the use of Canva and learning geometric shapes is that the use of Canva as a graphic design tool helps students create visualizations and provides interesting information about three dimensions, this can produce an interesting final product. Of course, in learning this project, it requires students to work together to search, design, measure and analyze spatial structures first in a real world context and integrate them into Canva.

2. Research Procedure

This research uses a quantitative experimental approach with a pre - test and post - test control group design Wahyuni, et al (2023). Pre - test and Post - Test Control Group Design Research Design appears in Table 2.1. The experimental group took part in Spatial Geometry learning using the Project Based Learning model supported by the Canva platform, while the Control group took part in Project Based Learning learning without the support of the Canva platform.

Table 2.1: Pretest and Posttest Control Group Experimental Research Design

Kelompok	Pre test	Perlakuan	Post Test
Kontrol	O ₁	(-)	O ₃
Eksperimen	O ₂	X	O ₄

Information:

O1: Control group results before treatment

O2: Experimental group results before treatment

O3: Control group results after no treatment

O4: results of the experimental group after being given treatment

X: Learning with treatment implementing the PjBL learning model using Canva

(-): Control group that was not given treatment

The population in this study was grade 7 students at SMP Advent 4 Paal Dua with the sample being grades 7A and 7C drawn randomly. This research instrument consists of tests and non - tests. The Test Instrument consists of an Initial Knowledge Test and a Final Knowledge Test to measure initial understanding and progress in understanding Spatial Geometry after learning. To collect student responses about

the experience of using the Canva platform in learning, a questionnaire was used. Observations are carried out to monitor student participation and involvement during learning. The t test with a significance level of 5% was used to significantly compare the initial and final knowledge of the experimental and control groups, which was analyzed with the help of Microsoft Excel software. Next, percentage analysis was applied to the data collected through a questionnaire to determine the level of student interest and motivation in learning in both groups.

3. Results and Discussion

The validity of the learning outcomes instrument measures and describes the items with the name content validity, for content validity in the field of educational research, especially mathematics, this test instrument is concerned with the measured ability indicators, suitability and the material tested represents the entire material studied. From the assessment results, there were 20 questions given to the control (O₁) class, namely 7A and experimental (O₂) 7B, to 20 students per class using the Product Moment correlation formula via Ms. Excel shows that the 20 questions are valid with the correlation coefficient value being in between using the consideration criteria of $0.40 \leq r \leq 0.70$. The validity of the instrument was analyzed using steps and criteria according to Guilford (1956). The calculation uses a significance level of 5% or 0.05 with $r_{table} = 0.4438$. From the criteria above, the value obtained by r_{count} is included in the category of quite precise or good enough so that it can be used as a research instrument and the results show $r_{count} > r_{table}$. It was found that the reliability results of the instrument in the control class (O₁) were $r = 0.84$ and in the experimental class (O₂) with $r = 0.83$. If this value is interpreted in terms of the correlation coefficient criteria, the r value is in the high category. This means that the level of consistency of the instrument is correct or good, in other words, if given to different subjects, different places and times, it will give relatively the same results. Measuring the validity of a questionnaire instrument is the same as calculating content validity, but in the case of the questionnaire in this study, a Likert scale with a scale of 5 to 1 is used, where 5 = Very good; 4 = Fair; 3 = Ordinary; 2 = Less; 1 = Very poor. In the reliability values of the control (O₁) and experimental (O₂) classes, it can be seen that both have a correlation value of $r > 0.70$. This indicator means that the questionnaire given is reliable and can be used many times. Next, the validity value of the motivation instrument which consists of 8 questions is calculated. The calculation uses a significance level of 5% or 0.05 with $r_{table} = 0.44$. The reliability value for the control class (O₁) received a value of $r = 0.82$ and for the experimental class (O₂) it was found that both had a correlation value of $r = 0.70$. These results show that the two reliability values mean that the questionnaire given is reliable and can be used many times. Research data was taken from the 7th grade population with a sample of two classes, namely 7A as control and 7B as experiment at SMP Advent 4 Paal Dua Manado. These data are the results of the pre - test and post - test from 20 students who were members of the control and experimental groups, with the average pre - test, post - test and the difference between the two as in **Table 3.1**. In the Control class the average pretest score is 17, which means students have quite diverse initial abilities. The average posttest score is 59.4 which shows a sufficient

increase compared to the pretest score which is also supported by an average difference of 42.2.

Table 3.1: Average score of Experiment Class and Control Class students

Indikator Pemandangan	Kelompok Eksperimen (Kelas 7B)	Kelompok Kontrol (Kelas 7A)
Pre test	19, 45	17, 00
Post Test	72, 40	59, 40
Perbedaan	52, 95	42, 20

From the complete data on pretest and posttest results, it can be seen that several students showed significant improvement, such as S5 with a point difference of 74. Some students also had relatively low pretest scores, such as S5, S7 and S12, who had low initial abilities. Other students showed relatively small improvements such as S15 with a 7 point difference. Experimental group students had an average pretest score of 19.45 which was higher than the control class. The average posttest score was 72.4, which was much higher than the control group and also with an average difference of 52.95. Most of the students in the experimental group showed significant improvement, with some students showing very large improvements such as S18 with a difference of 77 points and S13 with a difference of 72 points. Some students in the experimental group showed smaller improvements, such as S19 with a difference of 26 points and S16 with a difference of 27 points. Thus, the experimental group showed greater improvement in most students and some students showed high improvement such as S18. The control group also had an increase, but it was not as significant as the experimental group and it could be said that this increase was still lower than the experimental group. From this comparison, it can be concluded that the intervention applied to the experimental group was more effective in improving students' abilities compared to the control group. A higher increase in the experimental group indicates that the method or strategy implemented is successful and can have a significant positive impact on student learning outcomes. Furthermore, the results of the t test show that there is a significant difference between the posttest and pretest results of the control and experimental groups which shows that the control and experimental classes have statistically significant differences where each group has a p value <0.05 between the posttest and pretest. This evidence concludes that there is a significant difference between the two groups tested. A very small p value indicates that the observed result is unlikely to have occurred due to pure chance if the null hypothesis is true. Next, we will look at the results of the t - test post test values between the two groups. In the table results, there is strong enough evidence to conclude that there is a significant difference between the two groups tested in the post - test.

Table 3.2: Percentage of Student Interest in Learning According to Each Item

Interest Question Items	Average Percentage per Item Control Group	Average Percentage per Item Experimental Group
1	42%	56%
2	44%	58%
3	47%	56%
4	38%	36%
5	30%	46%
6	49%	55%

7	42%	52%
8	38%	50%
9	41%	35%
Overall Percentage	41%	51%

A p value smaller than 0.05, namely 0.003, indicates that the observed result is unlikely to have occurred due to pure chance if the null hypothesis is true. This shows that the differences between the experimental and control groups are real and statistically significant. It can be concluded that the hypothesis H0 is rejected and clearly states that there is a difference in student score results between using the project based learning learning model and students using the conventional project based learning learning model. Next, students' interest in the control group and experimental group was measured with the percentage results shown in Table 3.2. Based on this percentage table, looking at the criteria for interpreting the percentage of questionnaire answers by the control class, it shows that the answers of the control class students stated that almost half of the students chose enough with a percentage of 41%. Based on this percentage table, looking at the criteria for interpreting the percentage of questionnaire answers by the experimental class, it shows that the answers of the experimental class students stated that most of the students chose sufficient on the 6 interest questionnaire items and almost half of the students chose sufficient on the 3 interest questionnaire items with an overall percentage of 51%.

4. Conclusions and Suggestions

Effectiveness of the Canva - Based Project Based Learning (PjBL) Learning Method: This research shows that the application of the PjBL learning method supported by the Canva platform is more effective in increasing students' understanding of geometric shapes compared to the PjBL method without Canva. This can be seen from the significant difference in the increase in post - test scores between the experimental and control groups. The experimental group showed significant improvement in understanding geometric shapes. The average post - test score for the experimental group reached 72.4, higher than the control group which only reached 59.4. This shows that the use of Canva in project learning can have a significant positive impact on student learning outcomes. Initial and final knowledge test instruments, as well as interest and motivation questionnaires, have high validity and reliability. The instruments used were proven to be consistent and reliable for measuring students' understanding, interest and motivation towards the applied learning. The results of the questionnaire show that using Canva in PjBL learning increases student interest and motivation. Students in the experimental group showed higher interest in technology - based learning compared to students in the control group. The T test shows that there is a statistically significant difference between the post - test results of the control and experimental groups. A p value < 0.05 indicates that the observed differences are unlikely to occur due to chance, so it can be concluded that the intervention implemented is effective. In terms of implementing Canva - based PjBL, it is recommended that schools and teachers consider using Canva as a tool in implementing the PjBL learning method, especially in subjects that require visualization, such as spatial geometry.

Training is needed for teachers to optimize the use of Canva and other technology platforms in learning. This will help teachers develop learning materials that are more interactive and interesting for students. Further development of valid and reliable learning instruments needs to be carried out. The instruments used in this research can be used as a reference for developing other instruments in various learning contexts.

Researchers are advised to carry out further research to test the effectiveness of Canva - based PjBL in other subjects and at different educational levels. This will provide a more comprehensive picture of the benefits of using technology in learning.

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