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Canva Site-Based Learning Media Development on Polyhedrons to Improve Mathematical Representation Skills

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ABSTRAK

Penelitian ini bertujuan untuk mengembangkan media pembelajaran berbasis Canva Site pada materi Bangun Ruang Sisi Datar serta menganalisis tingkat validitas, kepraktisan, dan peningkatan kemampuan representasi matematis murid. Canva Site ini berbentuk microsite yang dirancang untuk menyajikan pembelajaran secara menarik dan mudah diakses dalam satu halaman. Metode yang digunakan adalah penelitian dan pengembangan (Research and Development) dengan model ADDIE yang meliputi tahap analisis, desain, pengembangan, implementasi, dan evaluasi. Subjek penelitian melibatkan 20 murid kelas VIII di salah satu SMP di Kabupaten Garut. Instrumen penelitian terdiri atas angket validasi ahli materi dan media, angket respons murid, serta tes pretes dan postes kemampuan representasi matematis. Hasil penelitian menunjukkan bahwa media pembelajaran berbasis Canva Site memiliki tingkat validitas sangat tinggi, dengan persentase validasi materi sebesar 89,95% dan validasi media sebesar 90,17%. Tingkat kepraktisan media berada pada kategori sangat praktis dengan persentase 84%. Selain itu, kemampuan representasi matematis murid mengalami peningkatan dengan nilai rata-rata gain sebesar 0,40 yang termasuk kategori sedang. Hasil ini menunjukkan bahwa media pembelajaran berbasis Canva Site layak dan efektif digunakan dalam pembelajaran matematika.

Kata Kunci: Media Pembelajaran; Canvasite; Kemampuan Representasi Matematis.

ABSTRACT

This study aimed to develop Canva Site-based learning media for the topic of polyhedrons and to examine its validity, practicality, and effectiveness in improving students' mathematical representation ability. This Canva Site takes the form of a microsite designed to present learning content in an engaging and easily accessible single page. The research employed a Research and Development approach using the ADDIE model, which consists of analysis, design, development, implementation, and evaluation stages. The participants were 20 eighth-grade students from a junior high school in Garut Regency. Data were collected through expert validation questionnaires for material and media, student response questionnaires, and pre-test and post-test instruments on mathematical representation ability. The results indicated that the developed Canva Site-based learning media achieved very high validity, with material validation reaching 89.95% and media validation 90.17%. The practicality level was categorized as very practical, with a percentage of 84%. Furthermore, students' mathematical representation ability showed a moderate improvement, indicated by an average gain score of 0.40. These findings suggest that Canva Site-based learning media are valid, practical, and effective in enhancing students' mathematical representation ability.

Keywords: Learning Media; Canvasite; Mathematical Representation Skills.

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1. INTRODUCTION

Mathematics is a highly useful discipline in carrying out human activities. Its role in various aspects of life is so significant that a strong belief in its importance is essential, especially for educators in various fields. Mathematical concepts are widely used in society, particularly in daily activities such as trade, business activities, carpentry, time management, and various other fields that require precision and calculation (Siregar & Dewi, 2022; Wiest, 2024). Therefore, mathematics is an essential subject to study, especially for students pursuing formal education (Kohen & Nitzan, 2022; Azkia, 2022), making it a core subject at all levels of school.

Mathematics learning is directed at developing a number of essential competencies (Geiger et al., 2022). The NCTM emphasizes that the objectives of mathematics learning include strengthening five fundamental competencies: problem-solving skills, mathematical communication, connections between concepts, reasoning, and mathematical representation (Hafriani, 2021; Khoerunnisa & Maryati, 2022; Francis, 2023; Hidayatullah, Sari, & Lutfianto, 2024). By mastering fundamental concepts, students are not only better prepared to face complex mathematical problems but also able to develop their mathematical thinking skills more optimally (Ling & Mahmud, 2023; Wakhata, Mutarutinya, & Balimuttajjo, 2023; Safari & Nurhida, 2024). Mathematics learning focuses not only on conceptual understanding and calculation skills but also on students' ability to represent mathematical ideas meaningfully.

Mathematical representation skills are an essential aspect that students need to master (Lestari et al., 2022; Kaitera & Harmoinen, 2022; Novianti et al., 2025). This is necessary to express their understanding because representation functions as a means to transform abstract ideas into more concrete forms through the use of images, symbols, verbal language, graphs, and various other forms of representation (Dewi & Sulistiyowati, 2025). When students are able to construct mathematical representations of their ideas, they gain various means of thinking that can significantly increase the depth and quality of mathematical reasoning (Mukuka, Balimuttajjo, & Mutarutinya, 2023; Kusumaningrum & Nuriadin, 2022). With this ability, students can connect abstract concepts with real-world situations, simplifying the thinking process, and helping them solve various mathematical problems more effectively and creatively.

Mathematical representation skills classify into three main forms: verbal representation, visual representation, and symbolic representation (Dewi, 2019; Sutiarso, 2023; Erita, Mulyani, & Putra, 2023). Verbal representation refers to students' ability to express and solve mathematical problems through verbal descriptions or written text. Visual representation relates to students' ability to present and solve problems in the form of pictures, diagrams, or graphs. Symbolic representation demonstrates students' ability to construct and solve problems using mathematical models in the form of symbols or algebraic operations. The indicators of

mathematical representation skills are summarized and presented in Table 1 (Amieny & Firmansyah, 2021):

Table 1. Indicator of Representation

Form of Representation	Indicator
Verbal Representation	Answer questions using words or written text
Pictorial Representation	Create images or graphics to solve given problems
Symbolic Representation	Solve problems by creating mathematical models or expressions

Facts on the ground state that representational ability is still in the low category. In one school in Cianjur Regency, based on the level of mathematical representation ability, it shows that grade X students are in the low category with a percentage of 31% (Abdurrahman, et al., 2023). In Sintia and Effendi's (2022) study at SMAN 1 Klari, students' representational ability is in the medium category, as indicated by 4 students (11.76%) in the high category, 26 students (76.47%) in the medium category, and 4 students (11.76%) in the low category. In line with Ramadhana's (2022) study at SMA Negeri 4 Praya, the average mathematical representation ability of students was 55.26, which indicates that students' mathematical representation ability is generally still relatively low. Mulyaningsih's (2020) research at SMPN 4 Cikarang showed that students with high mathematical abilities were able to meet the symbolic representation indicator very well, but were still not optimal in achieving the visual and verbal representation indicators. Meanwhile, students in the medium and low mathematical ability categories were not fully able to meet the three representation ability indicators, namely pictorial, symbolic, and verbal representation, comprehensively.

Previous research shows that many students still struggle to represent mathematical ideas in various forms, such as pictures, graphs, or symbols, making it difficult for them to connect abstract concepts to real-world contexts (Melani et al., 2024; Taneo & Daniel, 2025). The learning media used in schools today are still limited to books and presentation slides that are static and less interactive, making them less engaging for students (Nurpadillah & Afriansyah, 2025). This situation is further complicated by the limited availability of interactive and contextual learning media (Prabawati, Santika, & Mulyani, 2024). Therefore, innovative learning media are needed to enhance conceptual understanding and facilitate students' mathematical representation skills.

Mathematical representation is strongly linked to technology-based learning media in today's digital era. One alternative learning medium that can be utilized is learning media developed through Canva Site. Canva is a platform that teachers can utilize to design and develop learning media practically and efficiently (Lestiana et al., 2025; Kartina et al., 2025). The Canva Site platform, a feature of Canva (www.canva.com), allows users to create simple, attractive websites without requiring programming skills due to its engaging visualizations. Visual media also plays a significant role in supporting students' understanding of abstract concepts through

appropriate visualization (Qoriah et al., 2024). Unlike regular graphic design in Canva, this feature allows designs to be published as interactive web pages that can be accessed via a link (URL) on various devices. Through Canva Site-based media, students can display their mathematical representations in a visual, interactive, and engaging manner.

The urgency of developing Canva Site-based learning media lies in its important role in supporting the mathematics learning process, so it needs to be designed and developed in a structured manner. This research focuses on the development of Canva Site-based learning media and assessing its level of validity and practicality in mathematics learning, while also examining the improvement of students' representational abilities. Thus, this research is directed at developing Canva Site-based learning media on the material of polyhedron, assessing the feasibility of its use in learning activities, and analyzing the improvement of students' mathematical representation abilities.

2. METHOD

This research uses the Research and Development (R&D) method to produce Canvasite-based mathematics learning media. Media development is carried out using the ADDIE model which includes the stages of analysis, design, development, implementation and evaluation.

The first stage is analysis, which aims to identify initial conditions, learning needs, and supporting facilities available at the research location schools. This stage is conducted through observation and interviews with students to obtain relevant information as a basis for developing learning media to suit their needs. The second stage is design, which involves preparing the learning media design and gathering various materials needed for multimedia development. The third stage is development, which involves creating learning media based on the design and developing research instruments to assess the effectiveness of the learning media. The fourth stage is implementation, which aims to conduct limited trials of the learning media to assess the practicality and effectiveness of the product. The final stage in this process is evaluation, which includes formative and summative evaluations. Formative evaluations are conducted at each stage of development to obtain data as a basis for improvement and refinement, while summative evaluations are conducted at the end of the program to assess the impact of implementation on student learning outcomes and the overall quality of learning.

The limited trial was conducted on 20 eighth-grade students from a junior high school in Garut Regency. The use of learning media, particularly in mathematics, at the school was suboptimal, prompting the researchers to choose the school as the subject of this study. The students included six boys and 14 girls, with an average age of 14 years.

This research was conducted in the odd semester of the 2025/2026 academic year. Data collection was carried out using data collection through questionnaires. The instrument used was

a product assessment questionnaire to validate canvasite-based learning media, which involved three media experts and three mathematics teachers as validators of learning materials. The product assessment questionnaire for media validation consisted of 15 statement items covering aspects of learning, media, and design. The product assessment questionnaire for material expert validation consisted of 10 statement items covering aspects of content/material quality, learning objectives, feedback and adaptation, and motivation. A questionnaire was also used to measure practicality in the form of a student response questionnaire to canvasite-based learning media consisting of 40 statement items covering aspects of creativity, effectiveness, efficiency, interactiveness, and interest. As well as the pretest and posttest instruments consisting of 5 essay questions used to measure the improvement of students' mathematical representation abilities.

This study employed descriptive quantitative analysis techniques aimed at processing and interpreting data descriptively. The quantitative analysis was used to describe various inputs, suggestions, and assessments provided by validators as a basis for refining the developed product, obtained through a questionnaire. Descriptive quantitative data analysis was also used to describe the product's practicality based on the results of the student response questionnaire. The scores obtained from each aspect were summed and the percentage of achievement was calculated. Mathematically, this can be calculated using the following formula:

$$\text{Achievement percentage} = \frac{\text{The number of scores selected}}{\text{Ideal score}} \times 100\%$$

To determine the increase in students' mathematical representation abilities before and after learning using Canvasite-based learning media, a gain test was carried out using the normalized gain formula as follows:

$$\text{Gain Ternormalisasi(g)} = \frac{skor\ postes - skor\ pretes}{skor\ ideal - skor\ pretes}$$

3. RESULT AND DISCUSSION

This research resulted in learning media developed using the Canvasite platform. The results of the learning media developed were in accordance with the ADDIE stages: analysis, design, development, implementation, and evaluation.

a. Analysis

The analysis phase was conducted through observations and interviews with students at the research location. Observations indicated that eighth-grade mathematics instruction at the school had implemented the Independent Curriculum. Furthermore, the topic of Flat-Sided Solids was one of the topics taught at the eighth-grade level.

Based on the interviews, it was revealed that the use of digital learning media in mathematics learning was still suboptimal, and students had never used Canvasite-based learning media as a learning tool.

Based on these observations, learning media that are easy to operate and able to support the learning process according to student needs are needed. One alternative media that can be utilized is Canvasite, which is relevant to technological developments and current learning demands. This platform offers practicality because it can be accessed anytime through a single link, making it easier for students to follow the learning process. Canvasite-based learning media is also user-friendly, where students simply open the link shared by the teacher on a computer or smartphone without needing to download additional applications.

b. Design

The design of Canvasite-based learning media begins with the development of teaching materials, including learning objectives, presentation, sample questions, practice questions, and a final evaluation. This is followed by the design of the media's appearance, which includes the main menus used: the homepage and the learning materials menu. The learning materials menu consists of submenus for icebreakers, teaching materials, evaluation, and reflection, designed to support student engagement and understanding throughout the learning process.

The visual representation on Canva Site is supported by image and video features that clearly present polyhedrons. The images and animations allow students to see the shapes, faces, and edges of the polyhedrons from various angles and to zoom in for more detailed observation. This makes it easier for students to visualize polyhedrons and understand the concepts being taught.

The teaching materials menu features e-books and instructional videos that students can use as references during the learning process. The evaluation menu contains questions structured around the material studied, utilizing the Quizizz platform to present evaluations in a more engaging manner and facilitate students' direct assessment using their devices. Furthermore, the reflection menu provides reflective questions related to the learning activities undertaken, designed using Google Forms to facilitate student feedback and reflection on their learning.

c. Development

During the development phase, a learning module on polyhedrons was created and packaged using Canva Site-based media. The development process followed the detailed plan that had been prepared during the design phase, ensuring that each component of the module from textual explanations to visual and interactive elements was carefully structured to support students' understanding. Special attention was given to incorporating images, animations, and 3D models of polyhedrons, allowing students to explore faces, edges, and vertices from multiple

perspectives. This structured approach ensured that the media was not only visually engaging but also pedagogically aligned with the learning objectives of the module

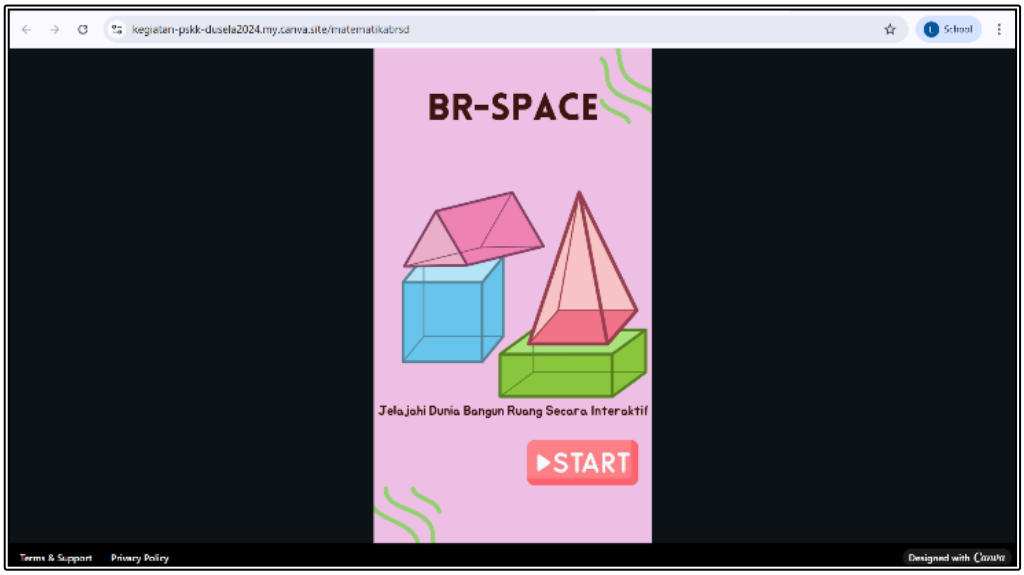

Figure 1. Home Page

Figure 1 shows the main page of the Canvasite-based learning media when it is first opened. This page features a start menu that leads to a page containing learning objectives, attendance, and icebreakers. The next menu contains a learning materials menu containing sub-topics that can be studied using this learning media. The following is a display of the learning materials page in Figure 2.

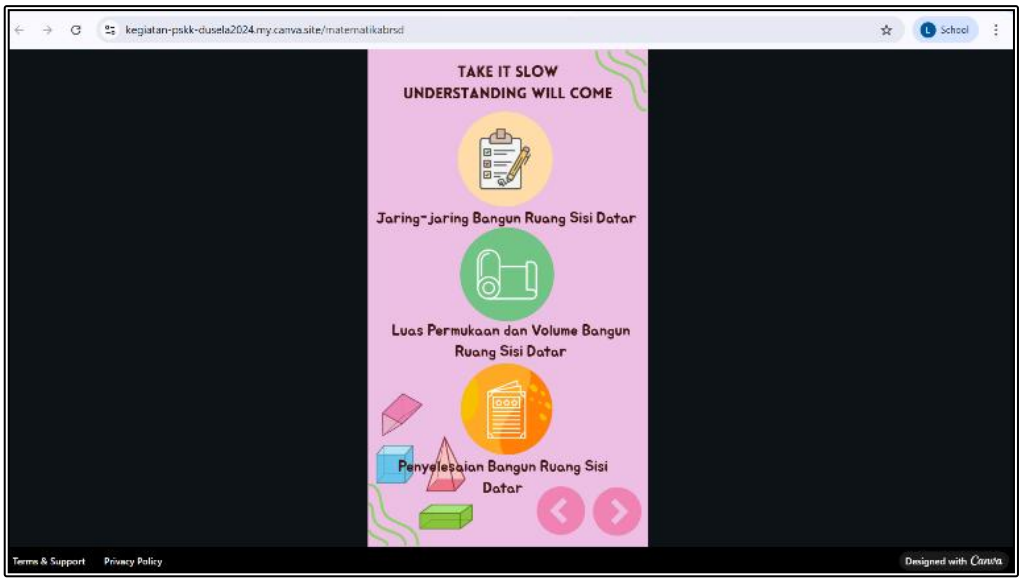

Figure 2. Learning Materials

On the learning materials page, there are three sub-topics that can be studied using this learning media, namely nets of flat-sided solid shapes, surface area and volume of flat-sided solid shapes, and solving flat-sided solid shapes. Each menu in the sub-topics contains a menu for teaching materials, evaluation, and reflection as shown in Figure 3.

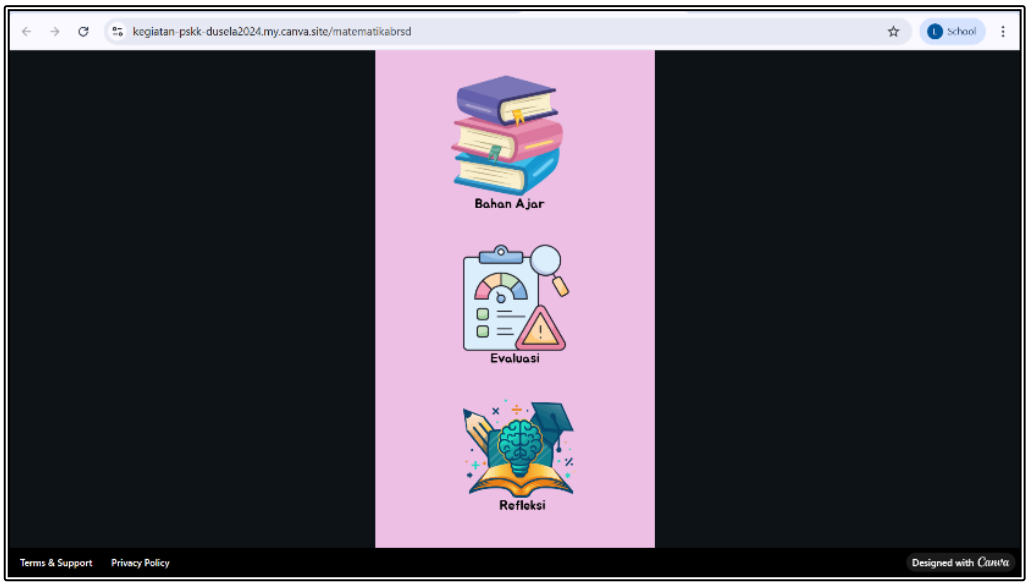

Figure 3. Sub Material Page

Next, the developed learning media was validated by experts. The Canvasite-based teaching module was validated by three subject matter experts, namely junior high school mathematics teachers. The validation produced by these experts regarding the learning media included the suitability of the learning media with: (1) content/material quality; (2) learning objectives; (3) feedback and adaptation; and (4) motivation. Table 2 shows the results of the subject matter expert validation.

Table 2. Material Expert Validation Results

Aspect	Ideal Score	Achievment Score			Achievment Persentage
		Validator 1	Validator 2	Validator 3	
Content/Materials	45	14	13	15	93,3%
Learning Objectives	45	12	14	13	86,6%
Feedback and Adaptation	30	10	7	8	83,3%
Motivation	30	10	9	10	96,6%
Total	150	46	43	46	89,95%

Table 2 shows that the quality of the content/material in the learning media is 93.3%, indicating that the learning media already includes material on flat-sided geometric shapes. The validation results for the learning objectives aspect showed a percentage of 86.6%, indicating that the content in the learning media is appropriate for achieving the desired learning objectives. The feedback and adaptation aspect showed a percentage of 83.3%, indicating that the learning media is sufficiently adaptive to the learning process. The motivation aspect showed a percentage of 96.6%, indicating that the learning media is able to motivate students to learn.

In addition to validation by material experts, the developed learning media was also validated by three media experts. The validation provided for this learning media covered the

following aspects: (1) learning; (2) media; and (3) design. The media validation results are presented in Table 3.

Table 3. Media Validation Results

Aspect	Ideal Score	Score			Persentage
		Validator 1	Validator 2	Validator 3	
Learning	75	23	22	20	86,6%
Media	75	25	23	23	94,6%
Desain	75	22	23	22	89,3%
Total	225	70	68	65	90,17%

Table 3 shows the percentage of achievement for the learning aspect of 86.6% with a very high level of validity, the media aspect of 94.6% with a high level of validity, and the design aspect of 89.3% with a very high level of validity. Thus, the Canvasite-based learning media developed shows a very high level of overall validity.

d. Implementation

To improve students' mathematical representation skills, this study began with a pretest to determine their initial abilities before participating in the lesson. Next, the lesson was implemented using Canvasite-based learning media designed to facilitate visual and interactive conceptual understanding. Students accessed the media using Chromebooks through a browser by opening a learning link shared by the teacher. The learning media trial was conducted in a single meeting, focusing on one subtopic related to Flat-Sided Solid Geometry.

After the learning activities were completed, students took a post-test to identify improvements in their mathematical representation skills after the learning process. In addition, students were asked to complete a response questionnaire regarding the Canvasite-based learning media. This step was carried out to obtain feedback in the form of information regarding the level of practicality of using the learning media. The level of practicality of the learning media was determined based on the results of the student response questionnaire regarding the Canvasite-based learning media, which are presented in Table 4.

Tabel 4. Student Response

Aspect	Ideal Score	Total Achievement Score	Achievment Persentage
Creative	640	557	87%
Efective	640	543	84%
Eficient	640	525	82%
Interaktive	640	528	82,5%
Interest	640	550	85,9%
Total	3200	2703	84%

Based on Table 4, it can be seen that all indicators assessing student responses to the Canvasite-based learning media developed are included in the very practical category. This is indicated by the average percentage value of 84% for all aspects, with the very practical criterion.

Furthermore, improvements in mathematical representation skills were analyzed by comparing students' pretest and posttest results and calculating normalized gain, which are presented in Table 5.

Table 5. Normalized Gain

Name	Pretest	Postest	Normalized Gain	Interpretation
A1	44	73	0.52	Medium
A2	42	68	0.45	Medium
A3	55	75	0.44	Medium
A4	57	77	0.47	Medium
A5	38	64	0.42	Medium
A6	56	78	0.50	Medium
A7	58	78	0.48	Medium
A8	47	70	0.43	Medium
A9	46	72	0.48	Medium
A10	40	75	0.58	Medium
A11	54	76	0.48	Medium
A12	58	78	0.48	Medium
A13	55	67	0.27	Low
A14	45	70	0.45	Medium
A15	50	68	0.36	Medium
A16	52	52	0.00	No increase occurred
A17	60	80	0.50	Medium
A18	58	60	0.05	Low
A19	46	63	0.31	Medium
A20	35	60	0.38	Medium
Average of Gain			0.40	Medium

Based on the results of the pretest and posttest score analysis in Table 5, students' mathematical representation skills showed a significant improvement after the learning process. This is reflected in the normalized gain values, which were mostly in the moderate category, with an average gain of 0.40. Based on Table 5, Student A16 did not show any improvement in learning outcomes, with an N-Gain score of 0.00. This may be due to several factors, such as technical difficulties in accessing the learning media, low student engagement during the learning process, or limited time spent studying the material. This explanation indicates that learning outcomes are influenced not only by the quality of the media but also by individual factors and learning conditions, thereby adding depth to the analysis.

This finding indicates that the Canvasite-based learning media implemented was able to facilitate students in developing their ability to represent mathematical concepts, both in symbolic, visual, and verbal forms, resulting in a gradual improvement in conceptual understanding. Although there were several students who experienced low improvements and

one student who showed no improvement, the results of the study generally showed a positive trend towards improving students' mathematical representation skills. The dominance of the moderate gain category indicates that the learning intervention used was quite effective in encouraging students to understand and communicate mathematical ideas better, so that the Canvasite-based learning media significantly improved students' mathematical representation skills.

e. Evaluation

The evaluation stage in this study was conducted by revising the product based on input, comments, and suggestions from experts. The validation results showed that the Canvasite-based learning media was deemed suitable for use in learning after several improvements were made according to recommendations to enhance the quality and effectiveness of the learning media.

The product of this research is a Canvasite-based learning medium for the topic of Flat-Sided Solid Geometry. This learning medium is designed to be easily accessible and can support both online and offline learning, thus assisting students in independent learning. Learning media can be considered suitable for use if it meets three main criteria: validity, practicality, and effectiveness (Sukmawati et al., 2023).

The material and media validity test involved 6 validators, consisting of three mathematics teachers and three media experts. The assessment results showed that the material validity was in the very high category with a percentage of 89.95%, which indicates that the developed material has met the criteria for quality teaching materials and is able to measure relevant learning aspects. Meanwhile, the media validity obtained a percentage of 90.17%, which is included in the very high category, so it can be concluded that the Canvasite-based learning media developed has met the eligibility standards as a good and valid learning media in terms of design and presentation.

The practicality of the learning media was assessed based on its ease of use by students, the primary users. Practicality was assessed through a student questionnaire describing their experiences using Canvasite-based learning media. The questionnaire analysis yielded a score of 84%, with the criteria of "very practical." These findings indicate that the learning media supports independent learning, enhances student creativity, creates a pleasant learning environment, and presents learning materials in a more engaging manner.

The analysis of students' mathematical representation skills showed a significant improvement, as indicated by an average gain of 0.40, which is in the moderate category. This indicates that the use of Canvasite-based learning media has a positive contribution to the learning process, particularly in helping students understand and represent mathematical concepts more effectively.

The improvement in visual representation is supported by the image, animation, and 3D object features in Canva Site, which allow students to view and manipulate polyhedrons from various angles to better understand their faces, edges, and overall shape. The N Gain improvement of "Moderate" at 0.40 aligns with similar research on interactive learning media, such as the use of interactive PowerPoint in social studies learning, which also showed an N Gain of 0.52 (moderate category) in student learning outcomes (Talia, et al., 2025). This indicates that short-term digital media interventions often produce moderate gains due to limited interaction time, yet still positively impact students' visual understanding and conceptual comprehension.

Thus, Canvasite learning media is considered effective in improving students' mathematical representation skills. Technology-based learning is considered effective in helping students understand the material and increasing their enthusiasm for learning. Monoarfa & Haling (2021) stated that Canva's advantages include providing a variety of attractive design options and can encourage increased creativity of teachers and students in designing learning, saving time in creating learning media, and being able to be operated not only via laptops but also via gadgets. However, the presence of teachers as facilitators during the learning process is still needed (Pujiastutik, 2019; Perry & Booth, 2024).

4. CONCLUSION

Based on the results of the analysis and discussion, it can be concluded that the canvasite-based mathematics learning media on the Flat-Sided Solid Geometry material is feasible to be applied in the learning process. The feasibility of this media is demonstrated by the fulfillment of the validity and practicality aspects as a learning media. This is supported by several findings, namely: (1) the results of expert validation of the media and material show a valid category with improvements, with a material achievement level of 89.95% and media achievement level of 90.17%; (2) the results of the practicality assessment based on the student response questionnaire obtained a percentage of 84% which is included in the very practical category; and (3) students' representation mathematical abilities experienced a significant increase with an average gain value of 0.40 which is in the moderate category. Practically, teachers can use this media to present polyhedron material more interactively, making it easier for students to understand the concept of polyhedrons. However, the limitation of this study, such as the relatively small sample size, is an important consideration, and future research is recommended to involve a larger sample to obtain more generalizable results.

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