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DEVELOPMENT OF CPS-BASED LEARNING MEDIA USING GOOGLE SITES TO IMPROVE STUDENTS' MATHEMATICAL LITERACY SKILLS

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ABSTRACT

Low mathematical literacy among students is a major challenge in junior high school mathematics education. Weak literacy causes students to have difficulty understanding and applying mathematical concepts in a contextual manner. This study aims to develop a Creative Problem Solving (CPS)-based learning medium using the Google Sites web platform, as well as to test the feasibility and effectiveness of this medium. The study was conducted at Junior High School 16 Jambi City with 29 eighth-grade students as subjects. The method used was the ADDIE development model (Analysis, Design, Development, Implementation, Evaluation). Research instruments included expert validation questionnaires, teacher and student response questionnaires, and mathematical literacy tests. Data analysis was conducted using quantitative descriptive techniques. The results showed that the developed learning media were highly valid (content validation at 83.33% and design at 92.63%), highly practical (practicality rated by teachers at 96.52% and students at 90.74%), and highly effective (effectiveness at 86.20%). The improvement in students' mathematical literacy skills is reflected in an N-Gain score of 0.63, which falls into the moderate category. Thus, the CPS-based learning media using Google Sites developed through the ADDIE model is deemed valid, practical, and effective in enhancing students' mathematical literacy. The implications of this study suggest that integrating the Creative Problem Solving approach with web-based technology can serve as an innovative alternative in the development of interactive learning media. Additionally, these results contribute to strengthening students' mathematical literacy through contextual, challenging, and problem-solving-based learning.

Keywords: CPS; google sites; learning media; mathematical literacy.

ABSTRAK

Rendahnya literasi matematis siswa merupakan tantangan utama dalam pembelajaran matematika tingkat SMP. Literasi yang lemah menyebabkan siswa kesulitan memahami dan menerapkan konsep matematika secara kontekstual. Penelitian ini bertujuan untuk mengembangkan media pembelajaran berbasis Creative Problem Solving (CPS) menggunakan platform web google sites, serta menguji kelayakan dan efektivitas media tersebut. Penelitian dilaksanakan di SMPN 16 Kota Jambi dengan subjek sebanyak 29 siswa kelas VIII. Metode yang digunakan adalah model pengembangan ADDIE (Analysis, Design, Development, Implementation, Evaluation). Instrumen penelitian mencakup angket validasi ahli, angket respons pendidik dan siswa, serta tes literasi matematis. Teknik analisis data dilakukan secara deskriptif kuantitatif. Hasil penelitian menunjukkan bahwa media pembelajaran yang dikembangkan dinilai sangat valid (validasi materi sebesar 83,33% dan desain 92,63%), sangat

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praktis (kepraktisan oleh guru 96,52% dan siswa 90,74%), serta sangat efektif (efektivitas 86,20%). Peningkatan kemampuan literasi matematis siswa tercermin dari nilai N-Gain sebesar 0,63 yang tergolong dalam kategori sedang. Dengan demikian, media pembelajaran berbasis CPS menggunakan web google sites yang dikembangkan melalui model ADDIE dinyatakan valid, praktis, dan efektif dalam meningkatkan literasi matematis siswa. Implikasi penelitian ini menunjukkan bahwa pengintegrasian pendekatan Creative Problem Solving dengan teknologi berbasis web dapat menjadi alternatif inovatif dalam pengembangan media pembelajaran interaktif. Selain itu, hasil ini memberikan kontribusi terhadap penguatan literasi matematis siswa melalui pembelajaran yang kontekstual, menantang, dan berbasis pemecahan masalah.

Kata kunci: *CPS*; *google sites*; literasi matematis; media pembelajaran.

Introduction

Education plays a crucial role in developing the quality of a nation's human resources. Law No. 20 of 2003 on the National Education System states that education aims to develop the potential of students to become individuals who are faithful, creative, independent, and responsible. Mathematics, as one of the fundamental fields of study, plays a significant role in achieving these objectives because it contributes importantly to the development of logical thinking and problem-solving skills (Payadnya & Wibawa, 2021).

One of the key competencies in mathematics education is mathematical literacy (Safrulloh & Desmayanasari, 2024). This literacy encompasses the ability to interpret, formulate, and solve mathematical problems in various real-life contexts (Yuberta et al., 2020). In an international context, PISA emphasizes the importance of mathematical literacy in measuring students' readiness to face global challenges (OECD, 2019). However, PISA results show that Indonesian students' mathematical literacy scores remain low, at 366 points in 2022, ranking 70th out of 81 countries (OECD, 2023). This is certainly concerning, as mathematical literacy skills can determine the quality of future generations.

At the local level, data on low mathematical literacy skills were also obtained from the results of a mathematical literacy test administered to students at Junior High School 16 Jambi City. The test was conducted by administering a validated mathematical literacy test developed by instrument experts. Based on the test results, it was found that students' mathematical literacy skills are still relatively low. The test was administered to 29 students, and the results showed that 13 students were able to convert problems in story questions into mathematical models, 10 students were able to apply mathematical concepts, facts, procedures, and reasoning, while only 2 students were able to determine appropriate strategies for selecting relevant mathematical concepts in solving problems. Supported by interviews with eighth-grade mathematics teachers, the main problem is that students are not interested in understanding the material in the learning process. Difficulties in communication among students for discussion also influence this, so they often seek explanations of the material independently through other sources. Learning resources available at school are limited to books and workbooks, and learning media are not very varied. During classroom

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instruction, teachers have made maximum efforts to fulfill their responsibilities as educators by imparting knowledge and guiding students. However, existing limitations prevent the learning process from running as optimally as hoped. Therefore, innovations in learning activities are needed to support improvements in students' mathematical literacy skills. One such innovation that can be utilized is the use of learning media.

To address these challenges, the development of learning media has become a strategic solution. The right media not only increases learning motivation but also helps students understand the material in a more contextual way (Amadi, 2023). According to (Furoidah, 2020), learning media plays an important role in creating an effective and meaningful learning process.

One form of media relevant to current technological developments is the use of Google Sites. Google Sites provides an easy-to-use and flexible website creation service capable of accommodating various digital learning formats (Mawarni et al., 2024). Research by (Murniasih & Nurlina, 2023) states that the use of Google Sites in learning can increase the interactivity and effectiveness of the learning process. This website allows teachers to present material, learning videos, and evaluations in an integrated and interesting way (Adzkiya & Suryaman, 2021).

The choice of learning model also significantly influences the improvement of mathematical literacy (Hidayat et al., 2019). The Creative Problem Solving (CPS) model is an approach that trains students to think critically and creatively in solving contextual problems. (Ovan & Nugroho, 2017) proved that the CPS model is effective in improving PISA-based mathematical literacy. Similar research by (Rohana et al., 2021) and (Yuberta et al., 2020) shows that CPS has a positive impact, especially on students with low abilities.

Although there are several studies that combine the Creative Problem Solving (CPS) model and web-based media, most have not specifically integrated the two into a single medium using the Google Sites platform. Research by (Islanda & Dermawan, 2023) and (Maryana et al., 2024) only assesses the potential of the CPS model and web-based media separately, without combining them into a structured media design. Meanwhile, the study by (Nurrijal et al., 2023) developed a CPS instructional design in a blended learning context using Moodle, but did not specifically examine the Google Sites web platform or the application of CPS stages in a single integrated medium. Similarly, research by (Lim & Han, 2020) demonstrated the effectiveness of online support systems for CPS in improving learning outcomes, but did not directly link this to the use of the Google Sites web platform.

Google Sites has features that systematically support each step in the CPS model (Fitriyah & Turmudzi, 2025). During the problem-understanding stage, teachers can embed videos, contextual images, or real-life case studies on the main page, while students are given reflection space through Google Forms or comment boxes to describe the problem in their own words. To generate ideas, integrating Google Docs or Jamboard allows students to collaborate in proposing various alternative solutions. In selecting the best solution, students can create an action plan or resolution procedure uploaded in slide or document format, which can then be easily and attractively organized on Google Sites. Finally, during the implementation and evaluation stage, the work results can be displayed on a dedicated page, and teachers or other students can provide feedback through comments or reflections, building an active feedback cycle. However, there may be challenges in implementing Google Sites as a web-based learning tool. Not all teachers have the readiness or digital competence to design and manage interactive learning media. On the other hand, infrastructure such as stable internet access, supporting devices (laptop/smartphones), and students' digital literacy also determine success. Additionally, students' ability to understand mathematical material through web-based media may vary depending on student characteristics and support from the learning environment.

Therefore, the research gap identified is the absence of learning media that explicitly integrates the CPS model into a single Google Sites web platform to improve students' mathematical literacy. This study aims to develop learning media based on the Creative Problem Solving model using Google Sites that can be used to improve the mathematical literacy of junior high school students. In addition to filling the previous research gap, this study is expected to contribute valid learning media in terms of content and design, practical for use by teachers and students, and effective in improving mathematical literacy. Considering the various potential obstacles in its implementation, the results of this study are expected to provide a comprehensive overview that takes into account both the potential for success and the challenges that may arise in implementing the media in the learning environment.

Research Methods

This study uses a research and development (R&D) approach that aims to develop CPS-based learning media using Google Sites to improve the mathematical literacy of junior high school students. In this study, the development model used is the ADDIE development model. This model consists of five stages, namely analysis, design, development, implementation, and evaluation (Branch, 2009).

Each of these steps has an important purpose. The Analysis stage aims to identify the possible causes of the existing gaps. This stage includes six more detailed sub-stages: 1) performance gap analysis, 2) setting objectives, 3) analyzing student needs and characteristics, 4) curriculum analysis, 5) analysis of available resources, and 6) developing a work plan. The Design stage is conducted to design the product to be developed. The Development stage aims to validate and determine the quality of the CPS-based learning media developed. The Implementation stage is to apply the tested product in real-world situations through actual teaching. Finally, the Evaluation stage is conducted to reflect on and revise what has been done in the previous stages to optimize product development.

The location of this development research is Junior High School 16 Jambi City. The test subject is an educator at Junior High School 16 Jambi City as an individual test practitioner. Then there are 9 eighth-grade students as practitioners in small group testing. Finally, there are 29 eighth-grade students who are the subjects of large group testing.

Data collection techniques were conducted based on three criteria: validity, practicality, and effectiveness (Udayani et al., 2024) . For the validity criterion, a design validation questionnaire and material validation questionnaire were provided to be validated by a team of experts. For the practicality criterion, there

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was a practicality questionnaire for the individual trial and small group trial. Finally, for the effectiveness criterion, there will be a student response questionnaire and a mathematical literacy ability test sheet to be administered during the large-scale trial.

In this study, the data analysis techniques used are tailored to the data collection instruments, namely: validation by subject matter experts and design experts to assess the suitability of the content and appearance of the developed learning media, analysis of student response questionnaire results to determine responses to the implemented media, and analysis of test results to evaluate improvements in students' mathematical literacy skills (Suryani et al., 2024).

Furthermore, each data analysis technique used in this study was analyzed using relevant approaches and measurement scales, with the following details:

Expert Validation Instrument Analysis Technique

To measure the attitudes, opinions, and perceptions of respondents containing statements with assessment criteria, a Likert scale was used, as shown in Table 1.

Table 1. Validation Scoring Scale

Category	**Score**
Strongly agree	5
Agree	4
Slightly Agree	3
Disagree	2
Strongly disagree	1

Source: (Sugiyono, 2015)

The scores obtained from the instrument scoring will be calculated using the average formula, namely:

$$P = \frac{\Sigma x}{\Sigma n} \times 100\% \qquad (1)$$

Explanation:
P = Percentage of media validation score
Σx = Total score obtained
Σn = Total ideal score

The results of the validity score percentage calculation for CPS-based learning media are presented in percentage form with the percentage criteria as shown in Table 2.

Table 2. Validation Interval Categories

Interval	**Categories**
$0\% \leq P \leq 20\%$	Invalid
$20\% < P \leq 40\%$	Less Valid
$40\% < P \leq 60\%$	Sufficiently Valid
$60\% < P \leq 80\%$	Valid
$80\% < P \leq 100\%$	Highly Valid

Source: (Akbar, 2013)

Based on Table 2, it can be seen that CPS-based learning media can be considered valid if it has a score in the interval $60\% < P \leq 100\%$.

Practicality Test Instrument Analysis Technique

The assessment used is the same as the validation instrument, namely a Likert scale to measure responses on an interval of 1–5. The practicality analysis of the student practicality questionnaire and teacher practicality questionnaire regarding Google Sites web learning media is determined through the following data analysis techniques:

$$P_G = \frac{Score\ obtained}{Maximum\ score} \times 100\% \quad (2)$$

$$P_S = \frac{Score\ obtained}{Maximum\ score} \times 100\% \quad (3)$$

Explanation:
P_G = Practicality score of individual trial questionnaire
P_S = Practicality score of small group trial questionnaire

After conducting an analysis to obtain the practicality score of the CPS-based learning media developed using the following formula:

$$P = \frac{P_G + P_S}{2} \quad (4)$$

Explanation:
P = The Practical Value of CPS-based Learning Media (%)
P_G = Practicality score of individual trial questionnaire (%)
P_S = Practicality score of small group trial questionnaire (%)

After obtaining the calculation results, the practicality intervals of the learning media developed in Table 3 will be categorized.

Table 3. Practicality Interval Categories

Interval	**Categories**
$0\% \leq P \leq 20\%$	Not Practical
$20\% < P \leq 40\%$	Less Practical
$40\% < P \leq 60\%$	Quite Practical
$60\% < P \leq 80\%$	Practical
$80\% < P \leq 100\%$	Very Practical

Source: (Akbar, 2013)

Based on Table 3, it can be seen that CPS-based learning media is considered practical to use if it is within the interval $61\% - 100\%$.

Effectiveness Instrument Analysis Techniques

a. Student Response Questionnaire

Scoring for the student response questionnaire instrument in the use of learning media by students uses quantitative descriptive analysis with the following formula:

$$P = \frac{score\ obtained}{maximum\ score} \times 100\% \quad (5)$$

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Explanation:
P = percentage value of student response questionnaire

Then, to determine the effectiveness of the developed learning media, it was categorized according to the score interpretation criteria according to (Akbar, 2013) as modified and presented in Table 4.

Table 4. Score Interpretation Criteria

Interpretation	**Categories**
$0\% \leq P \leq 20\%$	Ineffective
$20\% < P \leq 40\%$	Less Effective
$40\% < P \leq 60\%$	Moderately Effective
$60\% < P \leq 80\%$	Effective
$80\% < P \leq 100\%$	Highly Effective

Based on Table 4, the product is considered effective and usable if the score obtained is within the interval $60\% < P \leq 100\%$.

b. *Mathematical Literacy Test*

Analysis of students' mathematical literacy test by observing the improvement in their mathematical literacy through pre-tests and post-tests using CPS-based learning media. The mathematical literacy test given to students consisted of 5 questions. Each of these questions contained indicators of mathematical literacy, namely, 1) formulating situations in mathematical form, 2) applying mathematical concepts, facts, procedures, tools, and reasoning, and 3) interpreting, applying, and evaluating mathematical results. Assessment was carried out by calculating student scores using the following formula:

$$Score = \frac{score\ obtained\ by\ the\ student}{maximum\ score} \times 100 \qquad (6)$$

Furthermore, in measuring the magnitude of students' mathematical literacy abilities according to (Vebrian et al., 2021), it was modified as follows Table 5:

Table 5. Criteria for Mathematical Literacy Skills

Score Range	**Categories**
$80 \leq Skor < 100$	High
$60 \leq Skor < 80$	Medium
$40 \leq Skor < 60$	Low
$0 \leq Skor < 40$	Very low

c. *N-Gain Test*

To see changes in students' mathematical literacy skills before and after using the product, a trial using N-Gain analysis can be conducted. This is taken from the pretest and posttest scores completed by students. The N-Gain formula is:

$$N - Gain(g) = \frac{posttest\ score\ - pretest\ score}{ideal\ maximum\ score - pretest\ score} \qquad (7)$$

The criteria for interpreting N-Gain are as follows Table 6:

e-ISSN 2746-5594
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Table 6. Interpretation of N-Gain

Interval	Categories
$g \geq 0{,}7$	High
$0{,}3 \leq g < 0{,}7$	Medium
$g < 0{,}3$	Low

Source: (Ramdhani et al., 2020)

To determine the effectiveness interpretation category based on the N-gain value, refer to Table 7.

Table 7. Gain Effectiveness Interpretation Criteria

Percentage	Criteria
$< 40\%$	Ineffective
$40\% - 55\%$	Less Effective
$55\% - 75\%$	Moderately Effective
$> 75\%$	Effective

Source: (Akbar, 2013)

The minimum threshold for CPS-based learning media can be considered effective for use in the learning process if a moderate Gain score is obtained and the N-Gain percentage from the mathematical literacy test results is sufficiently effective with a percentage between 56%-100%

Results and Discussion

Analysis Stage

The core activities carried out in the analysis stage are as follows:

1. *Performance Gap Analysis*

From the findings of observations and interviews conducted at State Junior High School 16 Jambi City, it was concluded that the mathematical literacy skills of eighth-grade students were still relatively low. Although teachers have made efforts to provide active guidance and materials, improvements in students' mathematical literacy are still hampered by limited time to explore complex concepts in depth and limited learning resources, which consist only of textbooks and workbooks. The lack of variety in learning media also limits students in practicing and applying mathematical concepts in various contexts. Therefore, more innovative learning strategies and more diverse learning resources are needed to improve students' mathematical literacy.

2. *Setting Objectives*

This study aims to develop additional learning media in the form of CPS-based learning media using Google Sites to improve students' mathematical literacy skills as an effort to help students understand statistics and develop their mathematical literacy skills.

3. *Analysis of Student Needs and Characteristics*

The research conducted found that students' mathematical literacy skills are still weak in several important aspects. This lack of ability indicates that students are not accustomed to explaining their mathematical understanding clearly and logically, which may hinder them from actively engaging in classroom discussions and collaboration. To overcome this weakness, more interactive and

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contextualized learning approaches are needed, such as problem-based learning or the use of digital technology that can encourage students to develop their mathematical interpretation and communication skills.

4. *Curriculum Analysis*

A study was carried out with the aim of understanding the Merdeka curriculum applied at the school of observation, as well as to determine the appropriate material as the basis for developing CPS-based learning media using web google sites, with the aim of optimizing the mathematical literacy skills of eighth grade junior high school students.

5. *Analysis of Available Resources*

At State Junior High School 16 Jambi City there are resources, namely as follows: 1) Content resources, in the form of teacher books and student books from the Ministry of Education and Culture referring to the independent curriculum. 2) Technology resources, in the form of smartphones owned by each student. 3) Teaching facilities, in the form of classrooms and supporting devices in them, as well as math lesson schedules. 4) Human resources, in the form of instrument experts, material experts, design experts, mathematics teachers of State Junior High School 16 Jambi City, as well as the Grade 8K students of State Junior High School 16 Jambi City.

6. *Work Plan*

The work design in this study includes the preparation of a schedule, teamwork, product development specifications, and the structure of the material used during the development process.

Design Stage

The research was initiated by developing a mathematics learning website employing the Creative Problem Solving (CPS) approach through Google Sites to improve the mathematical literacy of eighth-grade students in statistics. The product will be designed according to the initial design (storyboard) and in the future, this product will be further revised based on input and comments from the expert team. The stages in the learning media are based on the steps of the CPS model. The following product design is presented in Figure 1 to Figure 6.

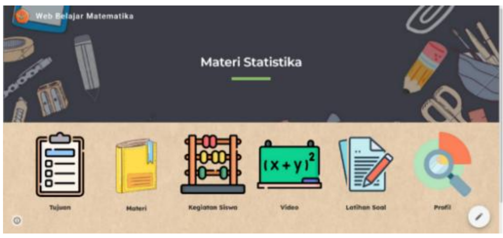

Figure 1. Main Menu Page

Figure 2. Learning Objectives Menu

Figure 3. Learning Materials Menu

Figure 4. Student Activities Menu

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Figure 5. Learning Video Menu

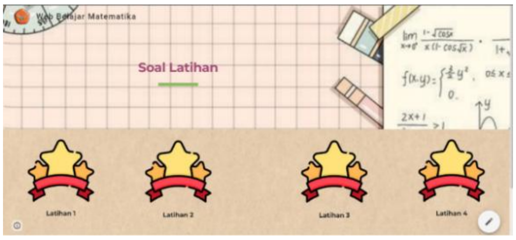

Figure 6. Practice Questions Menu

Development Stage

The activities carried out at this stage included quality testing by material experts and design experts on the mathematics learning website product based on the Creative Problem Solving (CPS) approach using Google Sites, as well as practicality testing by teachers and students. Furthermore, the product was revised and improved based on feedback and suggestions from both material experts and design experts before being implemented in the learning process. The results of the validation of the learning media quality are presented in Table 8.

Table 8. Results of Learning Media Quality Validation

Assessment Item	**Score**	**Percentage (%)**	**Criteria**
Material Validation	100/120	83,33	Very Valid
Design Validation	83/90	92,63	Very Valid
Practicality by Teacher	111/115	96,52	Very Practical
Practicality by Students	490/540	90,74	Very Practical

Based on the table, the results of the validation questionnaires conducted by the expert team show that the developed learning media was categorized as very valid, both in terms of material and design. Meanwhile, from the practicality test, the media was also classified as very practical, as evaluated by both teachers and students.

Implementation Stage

An effectiveness test was carried out through the implementation of the CPS-based learning media during the classroom trial. The field trial was conducted in Class 8K consisting of 29 students (18 male and 11 female). The learning activities were carried out in five meetings, consisting of four meetings in which the CPS-based learning media was implemented and one meeting where students were asked to complete a mathematical literacy test (posttest).

Table 9. Effectiveness Test Results of the Learning Media

	Pretest	***Posttest***	***N-Gain***	**Media Effectiveness**
Score	19,92	70,19	63%	86,20%
Criteria	Very Low	Medium	Quite Effective	Very Effective

Based on the table, the developed learning media proved to be effective in improving students' mathematical literacy. This is evident from the increase in scores, moving from the very low category at the pretest stage to the medium category at the posttest stage. The N-Gain score of 63% falls into the quite effective

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category, while the overall media effectiveness percentage of 86.20% is categorized as very effective.

Evaluation Stage

The purpose of the evaluation stage in the development of learning media is to produce a product that is valid, practical, and effective. The evaluation began with the analysis stage, in which interviews were conducted with mathematics teachers. During the design stage, evaluation was carried out through discussions with design experts to construct the initial framework of the CPS-based web media using Google Sites. The development stage continued with the creation of the web-based learning media, which was then validated by a team of experts who provided suggestions for improvement regarding both content and design. In the implementation stage, the evaluation focused on the effectiveness of the media in improving students' understanding. With its foundation in the CPS model and implementation through a web-based platform, this learning media is expected to serve as an effective tool to facilitate the improvement of eighth-grade students' mathematical literacy.

The findings of this study indicate that the use of CPS-based learning media developed through Google Sites significantly enhanced students' mathematical literacy. The improvement was observed in students' ability to understand problems, construct mathematical models, solve the models, and interpret solutions within the problem context. Students also demonstrated greater engagement, increased motivation to learn, and stronger critical and creative thinking skills. The success of this media can be attributed to several factors: the CPS approach, which is designed to foster higher-order thinking skills; the interactive and accessible design of the media; and the contextual presentation of content that aligns with students' real-life experiences.

This study offers several strengths, such as the innovation of integrating a creative learning model with digital technology, the accessibility of the media for students, and the potential to support self-directed learning. However, it also has limitations, including the narrow scope of implementation restricted to one class or school, and the absence of testing at other educational levels. In addition, challenges such as unequal internet access remain a concern in utilizing this media.

When compared with previous studies, these findings are consistent with (Ovan & Nugroho, 2017) , who demonstrated that the CPS model is effective in improving PISA-based mathematical literacy. Similar support is found in studies by (Rohana et al., 2021) dan (Yuberta et al., 2020) , which highlight the positive impact of CPS, particularly for low-achieving students. However, unlike those studies, which primarily examined the learning model, this research systematically integrates the CPS approach into a complete digital learning medium based on Google Sites. Compared to (Islanda & Dermawan, 2023) and (Maryana et al., 2024) , who only assessed either the potential of CPS or web-based media separately, this study advances the field by combining both elements into a single, complementary medium. Thus, this research not only reinforces previous findings but also addresses gaps in the literature by offering an integrated learning approach that bridges pedagogical strategies and digital technology.

Theoretically, this study contributes to expanding the discourse on the effectiveness of CPS when integrated with web-based digital media, particularly in the context of mathematical literacy. Practically, it provides an alternative learning medium that is both applicable and relevant to supporting 21st-century learning. This media can be utilized by teachers to encourage students to be more independent, think critically, and engage in contextual problem-solving that reflects real-life challenges. Furthermore, it holds potential for use in online or blended learning environments, especially in situations requiring flexibility and remote learning access.

Conclusion and Suggestion

Based on the results of the study and data analysis, the developed learning media was declared very valid, both in terms of content and design, with validation results from the material expert at 83.33% and from the design expert at 92.22%. In addition, this media was also found to be very practical for use in the learning process, as indicated by the practicality questionnaire results from teachers at 96.52% and from students at 90.74%. From the perspective of effectiveness, the learning media proved to significantly improve students' mathematical literacy, as shown by the increase in scores from the pretest (19.92) to the posttest (70.19), an N-Gain value of 63% (categorized as quite effective), and an overall effectiveness rate of 86.20% (categorized as very effective). Thus, the development of CPS-based learning media through Google Sites can be concluded to be valid, practical, and effective, and it contributes as an alternative digital learning tool that supports 21st-century skills.

This study, however, was limited to development and small-scale trials, so it is recommended to conduct broader trials in various schools with diverse student backgrounds in order to achieve stronger generalizations. Future research may develop similar media for other mathematics topics or different educational levels. In addition, integrating more complex interactive features in Google Sites, such as automatic quizzes and interactive videos, could be a promising direction for enhancing student engagement. It is also suggested that teachers receive prior training on the use of this media to ensure more optimal implementation in the classroom.

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