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Digital Mathematics Module Based on Problem-Based Learning Model with Classpoint Mathematics Gamification

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ABSTRACT

Problem solving skills is one of the most important skills students should achieve in mathematics. However, students' mathematical problem-solving skills still low. This research offers classpoint mathematics gamification in digital mathematics module based on problem-based learning. Thus, this research was conducted to develop a valid, practice, and effective mathematics digital module based on problem-based learning model with classpoint mathematics gamification (ChePomathGo) in improving students' problem solving skills. This study used the Plomp development model, including the preliminary research, prototyping, and assessment phases. Preliminary research involving 32 students and 1 teacher and prototyping and assessment phase involving 9 students in seventh grade junior high school. Data analysis used are descriptive analysis. The result shows that the mathematics digital module based on problem-based learning model with ChePomathGo is valid with an average score of 3.67 (very valid category), practice based on students' and teachers' positive responses, and effective to improve students' problem solving skills based on the results of the students' mathematical problem-solving skills test in small group evaluations with an average score of 75% (effective category). The implications of this research is the digital mathematical module developed can be a guidelines for researchers and teachers to improve students' mathematical problem-solving skills.

Keyword: Classpoint App, Digital Mathematics Module, Gamification, Problem-Based Learning, Problem Solving Skills

INTRODUCTION

Mathematical characteristics require analytical and structured problem solving. In addition to equipping students with conceptual skills, mathematics also trains students to deal with real-life problems (Mahfud et al., 2022; Şanal & Elmali, 2024). The objectives of mathematics learning include analyzing problem solving in various aspects of life that involve complex cognitive processes such as observation, understanding, experimentation, and review (Arnellis et al., 2021a; Hamdayani et al., 2024; Nurhadi et al., 2025). Problem-solving skills are critical to help students face challenges by applying them in everyday life, which involves careful observation to find the right actions to solve problems (Syaputra et al., 2025).

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However, reality shows that the problem-solving skills of students in Indonesia are still low. The 2022 PISA results placed Indonesia 69th out of 80 countries with a mathematics literacy score of 366 (OECD, 2023), indicating weak mathematical problem-solving skills among students. In addition, several previous studies have also shown that many teachers experience difficulties in facilitating students' mathematical problem-solving processes, especially in guiding students to analyze errors and evaluate solution strategies effectively (Hidayat & Chao, 2025; Jamaan et al., 2021; Wardoyo et al., 2021; Zainil & Arnellis, 2022).

Various efforts have been made to improve students' problem-solving skills. However, many teachers still use traditional teaching methods (Wardoyo et al., 2021), which pose various challenges in the learning process. In fact, teachers have a crucial role in improving student learning outcomes, including developing problem-solving skills (Aziz et al., 2024). Problem-Based Learning (PBL) has been proven effective in improving problem-solving skills (Lidiana & Sukestiyarno, 2023; Permatasari et al., 2019; Rohyati & Purwanto, 2023). However, implementing PBL in mathematics learning is often hampered by the presentation of unsystematic and interactive material (Cuong et al., 2025). Previous studies only highlighted the implementation of PBL but did not examine the support provided by interactive digital modules.

Therefore, this study examines digital mathematics module based on problem-based learning model with Classpoint mathematics gamification (ChePomathGo). ClassPoint is generally used to support teacher presentations (Akram & Abdelrady, 2023, 2025), but in this study, it is applied to adaptive digital-based exercises for students' mathematical problem solving. Meanwhile, gamification in mathematics learning is usually limited to scoreboards and rewards (Chen et al., 2023; Parra-González et al., 2021). However, this study optimizes digital-based (game-based) challenges to increase students' motivation to solve mathematical problems gradually. ChePomathGo is designed to help students understand mathematical concepts while improving problem-solving skills through a more engaging and interactive learning experience (Baikulova et al., 2024; Lee et al., 2024).

Several previous studies have proven that digital modules can increase student enthusiasm for learning and support mathematical problem solving or even high order thinking skills based on contextual learning (Arnellis et al., 2021b, 2018, 2020; Asmar et al., 2020; Yuanita et al., 2021). The novelty of this research lies in the integration of ChePomathGo, which differs from previous printed/static modules (Irwan et al., 2024; Kusumaningtyas & Supaman, 2020; Putri et al., 2023; Sulistyaningsih et al., 2019). This innovation offers personalized learning through adaptive feedback, scalability of material access and game-based learning for numeracy literacy, and high interactivity through polling, drawing, competitions, and real-time progress analysis. Another key innovation is using challenge-based gamification that encourages collaboration and competition in digital PBL. Thus, this research has the potential to create an adaptive, interactive mathematics learning ecosystem that supports the improvement of students' mathematical problem-solving skills.

Therefore, this study will develop a digital mathematics module based on problem-based learning model with Classpoint Mathematics Gamification (ChePomathGo). The research question is: What are the characteristics of a valid, practical, and effective digital mathematics module based on problem-based learning model with ChePomathGo in improving students' mathematical problem-solving skills? The urgency of this research is beneficial for teachers as an alternative digital module that can support technology-based learning while helping students optimize their mathematical problem-solving skills.

METHOD

Research Design

This research uses the Research and Development (R&D) method with the Plomp model (Plomp & Nienke, 2013), consisting of three stages:

Preliminary Research

This stage includes several analyses, namely:

a. Needs analysis, identifying learning problems as the basis for designing ChePomathGo-assisted digital PBL modules.
b. Curriculum Analysis, aimed at examining the material, objectives, and learning models for developing digital mathematics modules for grade VII.
c. Concept Analysis systematically compiles essential material using documentation, checklists, and notebooks. It then analyzes it descriptively to ensure material integration.
d. Student analysis, conducted through questionnaires and diagnostic questions, to tailor the digital module design to their abilities, understanding, and learning styles.

Prototyping Phase

Researchers developed digital mathematics modules, Prototype I, with attention to content, presentation, language, and graphics. Then, based on Figure 1, Prototype I was evaluated through formative evaluation.

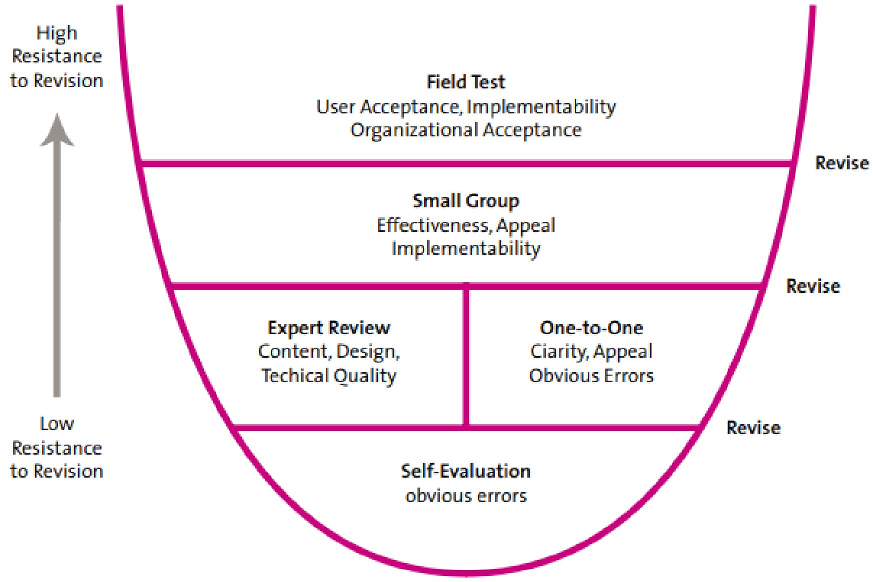

Figure 1. Formative evaluation process

a. Self-evaluation
Initial assessment by researchers, then revised into Prototype I for expert review.
b. Expert Review
Five validators assess the validity of Prototype I, which is then revised into Prototype II and analyzed using a Likert scale.
c. One-to-One Evaluation
Prototype III was tested on three seventh-grade students to descriptively assess the material, technical, and practical aspects.
d. Small Group Evaluation
Prototype IV was tested on six students to assess improvements, ease of use, and

effectiveness in improving mathematical problem solving.

Assessment Phase

After revision, field testing assessed the module's practicality and effectiveness in a real classroom. The trial was conducted in two main aspects: practicality and effectiveness.

a. Practicality was assessed in three ways:
   1) Observation of implementation involved observing how the module was applied in the classroom.
   2) Student questionnaires asked students for their opinions on the module's ease of use and usefulness.
   3) Teacher response questionnaires asked teachers/teachers for their responses to the module.
b. Effectiveness was measured through:
   Mathematical problem-solving skills tests were used to determine how much the module improved students' ability to solve mathematical problems.

Research Subjects

The subjects of this study were seventh-grade students at SMP Negeri 7 Padang in the odd semester of the 2025/2026 academic year and a teacher. These subjects participated in students' analysis 32 students, need analysis one teacher, one-to-one evaluation involving three students with low, medium, and high abilities and small group evaluation involving six students with low, medium, and high abilities to test the practicality and effectiveness of the digital mathematics module based on problem-based learning model with ChePomathGo.

Instruments

a. The instruments used in the preliminary analysis were checklists, interview guidelines, and student questionnaires.
b. The validity instruments were self-evaluation sheets and product validation sheets.
c. Practicality instruments are interview guidelines, student questionnaires, and teacher response questionnaires.
d. Effectiveness instruments include learning observations and mathematical problem-solving essay tests.

Data Analysis

The research collected qualitative data from interviews and quantitative data from questionnaires, observations, and problem-solving tests. The data analysis technique based on stages is:

Preliminary Research

Performed by: reducing data, presenting it, drawing conclusions, and then describing it using descriptive techniques.

Prototyping Phase – Assessment phase

a. Validity
   The stages are as follows:
   1) Data obtained from the validation sheet. The scoring for the validation sheet are based on the validation sheet scoring guideline that can be seen in Table 1.

Table 1. Validation sheet scoring guideline

Answer Option	Score
Strongly Agree	4
Agree	3
Disagree	2
Strongly Disagree	1

Source: Prepared by author

2) Using a formula (Walpole et al., 2012), determine the number of scores and the average the validator gives for each item.

$$\overline{X}_k = \frac{\sum_{i=1}^{n} X_{i,k}}{n}$$

$\overline{X}_k$: Avarage of item k
$X_{i,k}$: Validator i's validation score for item k
n : Number of validator

3) Calculating the validity of the PBL digital module validation sheet assisted by ChePomathGo using formula.

$$V = \frac{\sum_{k=1}^{m} \overline{X}_k}{m}$$

V : Device validity value
$\overline{X}_k$: Avarage of the k items
m : Number of items

The validity and revision of digital mathematics module based on problem-based learning model with ChePomathGo are determined based on product validity criteria shown in Table 2.

Table 2. Validity criteria based on the average value

Average Value (V)	Criteria
3.4 ≤ V ≤ 4.0	Very Valid
2.8 ≤ V < 3.4	Valid
2.2 ≤ V < 2.8	Quite Valid
1.6 ≤ V < 2.2	Less Valid
1.0 ≤ V < 1.6	Invalid

Source: modified from Pratiwi & Yarman (2024)

The digital mathematics module based on problem-based learning model with ChePomathGo are valid if the validity score is ≥ 2.8; if it is < 2.8, they must be revised before further testing.

b. Practicality

1) Analysis of interview results

Three stages of qualitative analysis: data reduction, presentation, and conclusion drawing.

2) Practicality questionnaire analysis

The practicality of the PBL digital module is measured using a Likert questionnaire and analyzed as a percentage (%) using the formula (Walpole et al., 2012).

$$P = \frac{R}{SM} \times 100\%$$

P : Practicality score
R : score obtained
SM: Maximum score

The practicality and revision of digital mathematics module based on problem-based learning model with ChePomathGo are determined based on product practicality criteria, which are shown in Table 3.

Table 3. Practicality criteria based on practicality score

Score Range	Practicality Criteria
$85 \leq P \leq 100$	Very Practical
$70 \leq P < 85$	Practical
$55 \leq P < 70$	Quite Practical
$40 \leq P < 55$	Less Practical
$25 \leq P < 40$	Not Practical

Source: modified from Pratiwi & Yarman (2024)

c. Effectivity

The effectiveness of the digital PBL module was analyzed using a formula based on the results of students' mathematical problem-solving tests.

$$N = \frac{R}{SM} \times 100\%$$

N : Final score
R : Score obtained
SM : maximum score

The effectiveness of digital mathematics module based on problem-based learning model with ChePomathGo is determined based on product effectiveness criteria, which are shown in Table 4.

Table 4. Effectiveness criteria based on the final score

Percentage (N)	Category
$80 \leq N \leq 100$	Excellent
$66 \leq N < 80$	Good
$56 \leq N < 66$	Fairly Good
$40 \leq N < 56$	Poor
$0 \leq N < 40$	Very Poor

Source: modified Pratiwi & Yarman (2024)

RESULTS AND DISCUSSION

Results

Preliminary Research

a. Needs Analysis

Needs were analyzed through classroom observations and interviews with teachers and seventh-grade students at SMP Negeri 7 Padang. Observations showed that student attendance reached 100% and lessons lasted for two 40-minute periods. However, the modules used were still in print form, lacked interactivity, and were not in line with the characteristics of the current digital generation, so students appeared to be less motivated to participate in lessons. Teachers have tried to adjust their approaches, models, and learning strategies to align with the student-centered principles of the Merdeka Curriculum, such as by implementing the Problem-Based Learning model. However, various obstacles remain, such as students' passive habits and unfamiliarity with problem-solving or collaborative work activities. From interviews with students, it was found that they are not yet accustomed to high-level questions and find it difficult to understand and solve mathematical problems. Students also expressed a desire to use attractive and interactive digital modules. When the researcher explained the plan to develop smartphone-based digital modules, the students responded positively because most already have adequate devices and internet access. Based on these findings, it is necessary to develop digital modules that support mathematics learning objectives and improve students' problem-solving skills.

b. Curriculum Analysis

A curriculum analysis was conducted on the Merdeka Curriculum used at SMP Negeri 7 Padang, specifically on the topic of algebraic forms in grade VII, which is included in phase D. This curriculum covers various materials such as an introduction to the basic concepts of algebraic forms, addition and subtraction, multiplication and division, factoring, and operations on algebraic fractions. In the student book published by the Ministry of Education and Culture, algebraic forms material begins with basic concepts, followed by algebraic form operations and contextual questions. The material has been systematically organized, and the allocation of learning time has also been arranged according to needs. Based on the results of documentation and analysis, the presentation of algebraic form material in the seventh-grade curriculum is considered adequate to achieve the learning objectives set out in the Merdeka Curriculum.

c. Concept Analysis

Concept analysis was conducted to identify essential material in algebraic forms and systematically organize the interrelationships between concepts. The material begins with an introduction to the basic elements of algebraic forms, such as variables, constants, and terms, as well as distinguishing between open and closed sentences in an algebraic context. Next, the writing of powers and algebraic substitutions is discussed. The material continues with algebraic operations, including addition, subtraction, multiplication, division, and algebraic fractions. These concepts are interconnected and organized in a concept map to support a structured learning process.

d. Student Analysis

Student analysis was conducted through questionnaires and interviews to explore their characteristics and abilities in learning mathematics. The results of the analysis show that many students find it challenging to understand the material because the teaching materials are not interesting and are still conventional, such as PowerPoint presentations and worksheets. On the other hand, students are not yet accustomed to challenging questions, so they cannot develop problem-solving skills. Mathematics learning also does not yet utilize interactive modules, even though students already have smartphones and adequate personal internet quotas. From interviews with teachers, it is known that students' problem-solving skills are still low, and many do not understand the material, even though teachers have tried to use approaches in line with the Merdeka Curriculum. Another obstacle is the students' passive habits and lack of familiarity with working together or actively participating in the learning process. Therefore, there is a need for attractive, Problem-Based learning digital modules that can increase student engagement in learning. These modules will be designed with the help of ChePomathGo to create a fun, active learning experience that can foster students' critical thinking and problem-solving skills.

Prototyping Phase – Assessment phase

The prototype module was designed based on the curriculum, learning objectives, and student needs. The self-evaluation stage identified several problems, such as punctuation errors, inconsistencies in terminology, and suboptimal visual arrangements, which were corrected before the expert validation process was carried out.

a. Expert review

Expert validation of the instruments and prototypes showed that the module met the validity criteria. The validation process was carried out by three experts from relevant scientific fields, namely: Dr. Ikha Parma Dewi, S.Pd., M.Pd. (learning technology expert), Dr. Afnita, M.Pd. (language expert), and Dr. Yulyanti Harisman, M.Ed. (mathematics education expert). They provided important input regarding technology integration, language clarity, and content suitability with learning objectives.

The instruments at each stage, whether the initial stage, prototype development, or summative evaluation, were validated using indicators such as clarity of objectives, accuracy of instrument items, the ability of the questionnaire to elicit information, clarity of assessment instructions, and accuracy of Indonesian language usage. The suggestions from the validators played a significant role in refining the instruments and improving the quality of the digital modules developed. The results of the research instrument assessment from expert review are shown in Table 5.

Table 5. Research instruments validity

Research Instrument	Average score	Criteria	Validator's Conclusion
Preliminary Research Instrument			
Teacher interview guide sheet	3.57	Highly Valid	Suitable for use
Student interview guide sheet	3.5	Highly Valid	Suitable for use
Concept analysis sheet	3.60	Highly Valid	Suitable for use
Curriculum analysis sheet	3.53	Highly Valid	Suitable for use
Average	3.55	Very Valid	Suitable for use

Prototype Design Stage Instrument (Validation and Practicality)			
Self-Evaluation Validation Sheet	3.5	Highly Valid	Suitable for use
MDSB-PjBL Validation Questionnaire by Experts	3.61	Highly Valid	Suitable for use
Practicality questionnaire during one-to-one, small group, and field tests	3.55	Highly Valid	Suitable for use
Interview guidelines with teachers	3.48	Highly Valid	Suitable for use
Interview guidelines with students	3.47	Highly Valid	Suitable for use
Average	3.52	Very Valid	Suitable for use
Assessment Stage Instrument (Effectiveness)			
Problem-solving ability test	3.46	Highly Valid	Suitable for use

Table 5 shows that all research instruments have met the validity criteria and are suitable for data collection. The preliminary instrument validation result is 3.55, which is categorized as highly valid. The MDM-PBL-ChePomathGo validation result from the expert is 3.47, which is also categorized as highly valid. The validation result for the Mathematical problem-solving skills test questions was 3.46, categorized as highly valid. Although it was already in the highly valid category, there were still improvements suggested by the validators. Table 6 presents the validators' suggestions for MDM-PBL-ChePomathGo instruments.

Table 6. Research instruments' suggestions on validity

Validator	Comments and Suggestions
1	a. The items in the questionnaire should not assess more than one aspect; that is, each sentence should assess only one aspect. b. The assessment must not be ambiguous; the sentence must be unambiguous.
2	a. The instruments used in the construct need improvement, especially for the assessment table, which must be integrated with the statements. b. Instructions and analysis must be synchronized.
3	a. The instruments used in preliminary research and practical applications need improvement, particularly in synchronizing the terms used, providing proportional space for answers, and aligning the items being assessed with the indicators. b. Synchronize the rating scale levels with the statement items.

The MDM-PBL-ChePomathGo prototype validation test results were obtained by conducting a prototype 2 validation analysis, as shown in Table 7.

Table 7. Results of Prototype 2 Validation Analysis of MDM-PBL-ChePomathGo

Aspects assessed	**Average Validity**	**Category**
Typing errors	3.8	Highly Valid
Presentation Aspects	3.5	Very Valid
Content Aspect	3.48	Very Valid
Language Aspect	3.67	Very Valid
Graphic/Appearance, Consistency, and Creativity Aspects	3.88	Highly Valid
Average validity	**3.67**	**Highly Valid**

b. One-to-one evaluation

Three students of different ability levels participated in the one-to-one evaluation. Low-ability students needed additional support, while medium- and high-ability students could use the module independently.

One-to-one implementation was carried out on seventh-grade students at SMPN 7 Padang. Before the lesson was given using the digital mathematics module based on problem-based learning model with ChePomathGo, the students were asked to observe the initial slide, namely the cover. Based on their assessment of the cover, the three students liked the design and stated that the background for each slide used was appropriate.

Next, as the student's teacher, the researcher began the meeting using Classpoint. Therefore, a laptop was prepared for the teacher to present the slides, and the students prepared smartphones with cellular networks. Students were first asked to join Classpoint by opening a browser on their smartphones using the access www.classpoint.app, then asked to enter the Class Code. The teacher would provide the Class Code (class code) displayed when the presentation began, then enter the student's name.

Students are given an aperception, prerequisite material for learning the material in each meeting. Next, they are given motivation, where many things in everyday life involve algebraic forms. The learning stages are carried out in accordance with the Problem-Based Learning syntax. From these stages, some activities can improve students' mathematical problem-solving skills through several indicators. In this study, the researcher took indicators of understanding problems, planning problem solving, implementing problem solving, and rechecking. Students began by observing and understanding the problem and then moving on to solving the problem, which was then recorded in the digital mathematics module based on problem-based learning model with ChePomathGo.

The results of the students' work on the indicator of understanding the problem showed that low-ability students used simple language, emphasizing only keywords and numbers. Medium-ability students were slightly more structured, while high-ability students could summarize the problem, although there were still errors.

The indicator of planning problem-solving shows that low-ability students have tried to develop a plan to solve the problem, but the steps chosen are inappropriate. Medium-ability students can develop a more focused plan to solve the problem, although there are still a few errors. Meanwhile, high-ability students can develop a systematic plan to solve the problem, although there are still a few errors.

Furthermore, the indicator for implementing problem solving shows that low-ability students have tried to take steps to solve the problem but do not yet know how to do it. Medium-ability students try to solve the problem quite well, although there are errors, and they do not finish. Meanwhile, high-ability students can solve the problem correctly and coherently, although there are still a few errors.

Finally, low-ability students did not answer the indicator of rechecking the solution to the problem. Medium-ability students tried to come to a conclusion but were still far from the correct answer. Meanwhile, high-ability students could conclude by determining the value of the considerations from the question, even though they were close to the correct answer.

c. Small group evaluation

The small group evaluation involved six students with various ability levels. The results indicated that students were more active, collaborative, and motivated using the module.

The effectiveness test showed that the average problem-solving score reached 75%, which is categorized as effective. The detailed results of the summative assessment are presented in Table 8.

Table 8. Recapitulation of Summative Assessment Based on Indicators of Mathematical problem-solving skills of Students in Small Group Evaluation

Name	**Problem-Solving Ability Indicator**				**Average**	**Criteria**
Student	**Understanding the problem**	**Planning Implement**	**Implement**	**Checking**		
PP	91.67	87.50	91.67	75.00	86.46	Very effective
KQ	83.33	87.50	75	75	80.21	Effective
KA	75.00	75.00	58.33	62.50	67.71	Fairly effective
AG	83.33	87.50	75	75	80.21	Effective
FA	75.00	87.50	58.33	62.50	70.83	Effective
MG	66.67	62.50	66.67	62.50	64.58	Fairly Effective
Average	79.17	81.25	70.83	68.75	**75.00**	**Effective**

Discussion

The results confirm that the digital mathematics module based on problem-based learning model with ChePomathGo is valid, practical, and effective.

Validity

The validation process demonstrated that the module achieved a highly valid rating across content, presentation, language, and graphics. This aligns with studies reporting that digital mathematics module based on problem-based learning model with ChePomathGo improve instructional quality (Marchy et al., 2022; Purnomo et al., 2024). The expert validators came from various fields—mathematics education, language, and learning technology—and suggested improvements to ensure the clarity and consistency of content and assessment indicators. Revisions included refining item statements, aligning rubric scales, and improving visual elements such as slide backgrounds and terminology usage.

Moreover, the expert review process supported the high validity score, which emphasized the alignment between learning objectives and module structure. This is consistent with previous research, which suggests that alignment between curriculum goals and instructional tools increases effectiveness and user satisfaction (Marchy et al., 2022; Purnomo et al., 2024). The incorporation of ClassPoint and Canva further adds pedagogical and visual quality, fulfilling recommendations from earlier studies about the importance of combining interactivity and design (Akram & Abdelrady, 2023, 2025). Thus, the module satisfies formal validation metrics and addresses practical classroom realities.

Practicality

Student responses during one-to-one and small group evaluations showed that the module was practical and easy to use. Features such as ClassPoint, Kahoot, and Canva attracted students' attention and encouraged active participation. These results are consistent with earlier findings that gamification and interactive tools enhance student engagement in mathematics learning (Akram & Abdelrady, 2023, 2025). During one-to-one evaluations, students with lower prior knowledge showed difficulty navigating the tool, yet they adapted and participated effectively with proper guidance.

In small group evaluations, the practicality of the module increased as students collaborated, solved problems, and received immediate feedback. Observations indicated that both high and low-ability students benefited from using the module, especially in the structured steps of problem-based learning. The ease of use, accessibility via smartphone, and engaging tasks contributed significantly to its practicality. This supports other research, highlighting the role of digital scaffolds in making learning more inclusive and student-centered (Azevedo & Hadwin, 2005; Nur et al., 2022). Based on these findings, the module fulfilled the practicality criteria, with an average score categorized as very practical.

Effectivity

The effectiveness test (Table 9) showed that students achieved an overall score of 75%, which is categorized as effective. Students performed best in understanding the problem and planning the solution, while the lowest performance was in reviewing. This suggests that although students can apply problem-solving strategies, they need more training in reflective and metacognitive skills. Similar findings have been reported in previous studies (Şanal & Elmali, 2024) and support a meta-analysis that concluded that PBL significantly improves Mathematical problem-solving skills (Suparman et al., 2021).

Additional qualitative data from interviews support these quantitative results. After using the module, students reported increased confidence in solving contextual problems and a deeper understanding of algebraic concepts. They also appreciated the inclusion of videos, visual tasks, and interactive challenges, which helped them engage more meaningfully with the content. Teachers observed increased student motivation and autonomy in solving multi-step problems. The alignment of instructional design with problem-based learning syntax—orienting to problems, investigating, presenting results, and evaluating—further ensured the development of higher-order thinking skills. As noted in previous research, this approach is especially effective for improving students' reasoning and persistence in tackling complex tasks.

CONCLUSION

This study concludes that the digital mathematics module based on problem-based learning model with ChePomathGo, developed through the Plomp Model, is valid, practical, and effective in improving students' problem-solving skills. The validity results show that the module meets content, presentation, language, and graphics criteria. The practicality results show that both students and teachers responded positively to the module, considering it easy to use and interesting. Effectiveness tests show that the module successfully improves mathematical problem-solving skills, particularly in understanding and planning, although students still need additional support in reviewing their solutions. Integrating PBL with ChePomathGo, ClassPoint, and Canva distinguishes this research from previous studies and enriches mathematics learning resources in line with the Merdeka Curriculum.

This study is still limited on the number of the students involved, for further research mathematics module based on problem-based learning model with ChePomathGo will need to be tested on the real class. To test the effectivity more advanced quasi-experiment or even true experiment need to be conducted. The implications of this research is the digital mathematical module developed can be a guideline for researchers and teachers to improve students' mathematical problem-solving skills. Researcher can also make more innovative digital mathematics module, integrated with latest application, etc.

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