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DEVELOPMENT OF PESONA APPLICATION BASED ON PBL TO ENHANCE STUDENTS' CRITICAL THINKING SKILLS

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Abstrak
Rendahnya kemampuan berpikir kritis peserta didik pada topik konflik sosial dalam mata pelajaran IPS dipicu oleh media ajar yang belum mendukung penelaahan kasus secara runtut. Studi ini dilakukan untuk menghasilkan aplikasi PESONA yang berlandaskan *Problem-Based Learning*, menilai tingkat kevalidan dan kelayakannya, serta mengkaji keefektifannya dalam menumbuhkan berpikir kritis siswa SMP. Pendekatan yang dipakai adalah Research and Development dengan model ADDIE. Keefektifan diuji melalui rancangan satu kelompok yang diberi pretest dan posttest, dengan subjek peserta didik kelas VIII pada sebuah SMP negeri di Bandar Lampung. Pengumpulan data memanfaatkan tes, angket, observasi, dan wawancara, sedangkan analisisnya bersifat deskriptif disertai perhitungan N-Gain. Temuan menunjukkan bahwa para ahli menilai aplikasi sangat valid dan layak, sementara guru dan peserta didik memberikan respons sangat baik. Berpikir kritis peserta didik meningkat dengan kategori tinggi, dan peningkatan itu terjadi pada setiap peserta didik. Dengan demikian, PESONA berbasis *Problem-Based Learning* layak serta efektif digunakan sebagai media IPS untuk melatih berpikir kritis, namun masih perlu diuji dengan desain yang memakai kelompok kontrol.

Kata Kunci: aplikasi PESONA; Problem-Based Learning; Berpikir Kritis; Konflik Sosial; Media Interaktif

Abstract
The low level of students' critical thinking on social conflict topics in Social Studies is driven by learning media that do not yet support step-by-step case analysis. This study produced the PESONA application grounded in Problem-Based Learning, assessed its validity and feasibility, and examined how effectively it fosters critical thinking among junior high school students. A Research and Development approach with the ADDIE model was applied. Effectiveness was tested through a one-group pretest–posttest design involving eighth-grade students of a state junior high school in Bandar Lampung. Tests, questionnaires, observations, and interviews provided the data, which were examined descriptively together with normalized gain. The findings show that experts rated the application as highly valid and feasible, while teachers and students responded very positively. Students' critical thinking rose within the high category, and every student showed an increase. Therefore, the PESONA application based on Problem-Based Learning is feasible and effective as a Social Studies medium for training critical thinking, although it still needs to be tested with a design that includes a control group.

Keywords*: PESONA application; Problem-Based Learning; Critical Thinking; Social Conflict; Interactive Media*

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INTRODUCTION

Advances in digital technology have driven the development of application-based instructional media capable of presenting learning materials in more engaging, interactive, and contextually relevant ways (Ariatama et al., 2021; Miftah, 2022; Nurmalisa et al., 2023; Septianingsih, 2023). Media serve to convey instructional messages and foster student engagement (Arsyad, 2020). In Social Studies (IPS), such media are particularly necessary because the social phenomena being studied are highly complex, making lectures and textbooks alone insufficient (Susanto & Ismaya, 2022). Nevertheless, technology, including generative artificial intelligence, does not automatically strengthen students' reasoning. Without an appropriate pedagogical design, technology can become a shortcut for completing assignments and reduce the depth of thinking (Kasneci et al., 2023). Furthermore, the benefits of technology are also determined by teachers' pedagogical beliefs and digital competencies (Edi, 2025; Tondeur et al., 2018).

Critical thinking is an integral requirement of Social Studies learning objectives. Students are expected not only to understand concepts but also to interpret social events, consider various perspectives, and make accountable decisions. The topic of social conflict in Grade VIII provides ample opportunities to develop these skills because conflicts occur in everyday life, ranging from families and schools to the wider community. If this topic is taught solely through memorization, covering definitions, causes, forms, and impacts of conflict, students lose opportunities to connect concepts with real-world cases and develop their reasoning skills.

Critical thinking is understood as the ability to reason reflectively when deciding what to believe or do. Ennis (2018) outlines four indicators: providing simple explanations, developing basic skills, drawing conclusions, and providing further explanations. This ability is essential when studying social conflict because conflicts involve multiple dimensions and competing interests, requiring students to examine causes, understand different perspectives, and evaluate alternative resolutions. However, field conditions indicate a concerning situation. A preliminary study at SMP Negeri 44 Bandar Lampung revealed that the average scores for the indicators of drawing conclusions and providing further explanations were only approximately 2.0, below those for developing basic skills (2.63) and providing simple explanations (2.54). Interviews with Social Studies teachers revealed that the media currently used consisted of textbooks, worksheets, presentations, and videos, while interactive media for independent learning were not yet available. Teachers also reported that students still struggled to analyze problems, articulate their reasoning, and determine solutions. Thus, the abilities to draw conclusions and provide further explanations, which are central to reasoning about social conflict, have not been adequately developed.

Several previous studies have developed interactive media to foster critical thinking. Hamdani et al. (2022) developed Android-based interactive multimedia, while Legina and Sari (2022) and Hardiansyah et al. (2026) used Articulate Storyline in science education. Muttaqin et al. (2021) developed Android-based interactive media for elementary school science, and Sarji and Mampouw (2022) designed educational game media for junior high school students. In the social sciences, Putra et al. (2022) introduced a chat novel for teaching forms of social interaction in sociology. Cahyani and Ramli (2026) strengthened social skills through case-based learning involving local issues in Social Studies, while Pratiwi et al. (2018) reported the development of flip-chart media for elementary school science. These studies demonstrate that interactive media have been widely developed and associated with critical thinking. However, they cover various subjects and educational levels, with most focusing on science.

Problem-Based Learning (PBL) uses problems as the starting point for learning, enabling students to develop flexible knowledge, problem-solving skills, and collaborative abilities under the

guidance of a facilitator (Hmelo-Silver, 2004). The outcomes of PBL are strongly influenced by the quality of problem design and facilitation, as this approach can lead to either deep or superficial learning (Dolmans et al., 2016). Consequently, digital media intended to foster critical thinking need to be designed around clearly defined instructional stages. PBL is well suited to the topic of social conflict because conflict cases can serve as authentic problems to be examined progressively, from identifying their causes and considering the perspectives of the parties involved to developing alternative solutions. These stages align with the critical thinking indicators proposed by Ennis (2018). Game elements and quizzes can complement this design to sustain students' behavioral, emotional, and cognitive engagement (Fredricks et al., 2004), as demonstrated by educational game media developed for junior high school students (Sarji & Mampouw, 2022).

Based on this review, previous studies have generally focused on science or other educational levels, and no studies have yet been identified that integrate PBL instructional stages, social conflict case studies, and game elements into a single offline application for junior high school Social Studies, using Ennis's critical thinking indicators. This integration constitutes the novelty of the present study. An offline application was selected because internet access at schools is not always stable, allowing the media to remain accessible for both independent and classroom learning without an internet connection. An application integrating social conflict cases, PBL instructional stages, and game elements in an offline format is expected to provide an alternative medium that supports Social Studies learning while developing students' reasoning skills.

In response to this research gap, the research problem is formulated as follows: how valid, feasible, and effective is the PBL-based PESONA (Interactive Social Learning) application in enhancing junior high school students' critical thinking skills in the topic of social conflict? This study aims to develop the PBL-based PESONA application, evaluate its validity and feasibility, and analyze its effectiveness in enhancing the critical thinking skills of Grade VIII students at SMP Negeri 44 Bandar Lampung.

METHOD

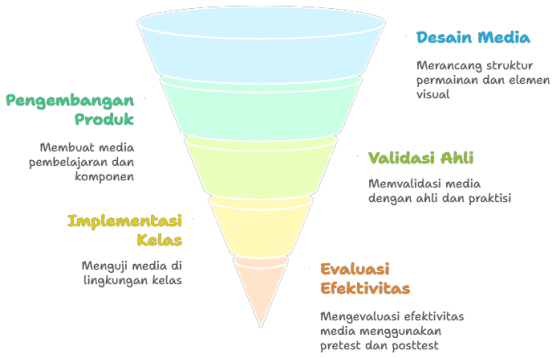


Figure 1. R&D Research Scheme with ADDIE Model

This study employed a Research and Development (R&D) approach based on the ADDIE model (Branch, 2009), which comprises five stages: Analysis, Design, Development, Implementation, and Evaluation, as illustrated in Figure 1. This model was selected because its stages are systematic and flexible and provide opportunities for formative evaluation at each stage. During the Analysis stage, the researchers interviewed two Social Studies teachers and measured students' initial critical thinking skills. The Design stage involved preparing the learning materials, activities, storyboard, and instructional syntax. The Development stage produced the application and its user guide, which were subsequently validated by language, subject matter, and media experts and then revised. During

the Implementation stage, the application was implemented in the classroom, while the Evaluation stage assessed the feasibility and effectiveness of the product.

Effectiveness was tested using a pre-experimental design in the form of a one-group pretest–posttest design (Sugiyono, 2013). The subjects were selected purposively, involving one of the seven Grade VIII classes at SMP Negeri 44 Bandar Lampung (Class VIII B, 33 students), taking into consideration the number of students, time constraints, and their initially low to moderate critical thinking abilities. The research instruments were pilot-tested on 33 Grade VIII students from Class VIII D, who were not included in the sample.

The instructional treatment was conducted in accordance with the PBL syntax: orienting students to the problem, organizing students for learning, guiding investigations, developing and presenting the work, and analyzing and evaluating the problem-solving process. Game elements were incorporated through the game's menu and quizzes within the application, while the teacher acted as a facilitator.

Data were collected through teacher interviews, validation sheets, questionnaires, tests, and observations. The validation sheets used a scale of 1 to 5 and were completed by three validators: a language expert, a subject matter expert, and a media expert. The teacher questionnaire consisted of 18 statements with a maximum score of 72, while the student questionnaire consisted of 20 statements using a four-point Likert scale, covering learning effectiveness, learning interest and motivation, feasibility and ease of use, and the impact on critical thinking. The critical thinking test consisted of essay questions based on social conflict case studies and addressed the four indicators proposed by Ennis (2018). The pretest and posttest were developed using equivalent materials and levels of difficulty.

Item validity was examined by comparing the calculated r value with the critical r value (0.329) using SPSS 27 at a significance level of 0.05. All reported items were found to be valid. Reliability was assessed using Cronbach's alpha, yielding a value of 0.977, indicating very high reliability. Validation and questionnaire data were converted into percentages of the maximum possible scores and then categorized. Test data were analyzed descriptively (minimum, maximum, and mean scores) and using N-Gain, with the following criteria: high ($g \geq 0.70$), moderate ($0.30 \leq g < 0.70$), and low ($g < 0.30$). Observation and interview data were analyzed descriptively.

RESULT

The needs analysis revealed that Social Studies instruction at SMP Negeri 44 Bandar Lampung already utilized textbooks, worksheets, presentations, and videos but lacked interactive application-based media that would enable independent learning. Both teachers reported that students were more interested in visual and digital media but still struggled to analyze problems, provide reasoning, and determine solutions. The initial assessment placed the indicators of developing basic skills and providing simple explanations in the moderate category (2.63 and 2.54, respectively), while the indicators of drawing conclusions and providing further explanations received the lowest scores (approximately 2.0).

During the Design stage, the social conflict materials were organized into seven components: definition, causal factors, forms, impacts, resolution, everyday case examples, and exercises and quizzes. Each component was paired with critical thinking activities, such as analyzing causal factors, classifying forms of conflict based on case studies, and determining alternative solutions.

The instructional design followed the PBL syntax, which was mapped onto the application features as presented in Table 1. Thus, each feature served a specific stage of the thinking process required by PBL rather than functioning independently.

Table 1. Alignment of PBL Syntax with PESONA Application Features

PBL Syntax	Learning Activity	Supporting Feature
Orienting students to the problem	The teacher presents a social conflict case and guiding questions.	Introductory video and case presented on the interactive board
Organizing students for learning	Students form groups and receive a case study.	Case assignment by the teacher
Guiding investigations	Groups identify the causes, impacts, and possible solutions to the conflict.	Materials and Case Study menus
Developing and presenting the work	Groups present their findings and receive feedback.	Class presentations
Analyzing and evaluating the problem-solving process	The teacher and students reinforce concepts, reflect, and draw conclusions.	Practice Through Games (Monopoly Game) and Quiz

The design was translated into a storyboard comprising eight screens: the opening page, main menu, learning materials, case studies, Monopoly Game, instructional videos, audio quizzes, and timed quizzes. The storyboard served as a reference to ensure a consistent navigation flow, from application introduction to exercises and evaluation.

Development began with creating the initial interface designs in Canva, which were then assembled into an interactive application using Adobe Animate. Navigation, videos, audio, games, and quizzes were developed using ActionScript. The PESONA application opens with a page displaying the PESONA logo and the tagline "Play and Learn" (Figure 2), followed by the main menu, which contains learning materials, instructional videos, case studies, Monopoly Game, audio quizzes, and timed quizzes.



Figure 2. PESONA Application Landing Page

The PESONA application can be accessed offline and is accompanied by a teacher's guidebook containing the application's identity and a QR code for accessing it (Figure 3).



Figure 3. Guide Book and PESONA Application Access

Validation by the three experts placed the application in the very valid category, with an overall mean score of 4.58 or 91.53%, and each validator assigned it to the very valid category (Table 2). The media expert's suggestions primarily concerned font size and readability; therefore, the font size was adjusted. The revisions made were not fundamental.

Table 2. Expert Validation Result Summary

Validator	Average Score	Percentage	Category
Language Expert	4,53	90,6%	Very valid
Subject Expert	4,20	84,0%	Very valid
Media Expert	5,00	100%	Very valid
Overall Score	4,58	91,53%	Very valid

During the implementation stage, 33 students from Grade VIII B completed the pretest, studied social conflict using PESONA in accordance with the PBL syntax under the teacher's guidance, and then completed an equivalent posttest.

Throughout the learning process, students studied the materials, examined case studies, played the Monopoly Game, and completed quizzes and exercises, with the interactive screen serving as the focal point of classroom activities (Figure 4), while the teacher acted as a facilitator. The photographs were published with permission from the students, their parents/guardians, and the school.



Figure 4. Student Completing a Quiz in the PESONA Application

During the evaluation, two Social Studies teachers assigned scores of 64 and 62 out of a maximum of 72, indicating that the application was rated very good. The student questionnaire results indicated ease of use, with a mean score of 72.85 out of 80, or 91.06%. All questionnaire indicators were categorized as very good, with percentages ranging from 87.73% to 96.40% (Table 3).

Table 3. Percentage of Student Response Questionnaire Scores by Indicator (n = 33)

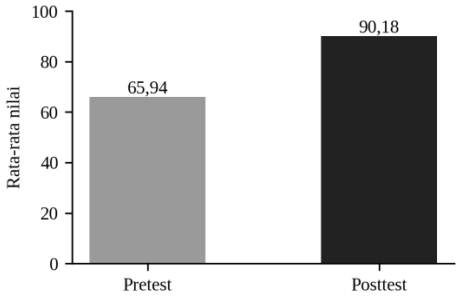
Response Indicator	Score Percentage	Category
Learning effectivity	88,64%	Very good
Interest and learning motivation	96,40%	Very good
Feasibility and ease of access	87,73%	Very good
Impact on critical thinking	91,77%	Very good

Observations of students' understanding showed an increase in the mean score from 63.87% to 96.12%, while the number of students in the very good category increased from one to 28. The mean critical thinking test score increased from 65.94 to 90.18, representing an increase of 24.24 points (36.76%). The minimum score rose from 60 to 80, while the maximum score increased from 76 to 100 (Table 4). The mean N-Gain was 0.7144 (71.44%), placing it in the high category. A total of 19 students (57.58%) were in the high category, 14 students (42.42%) were in the moderate category, and none were in the low category.

Table 4. Summary of Critical Thinking Pretest and Posttest Scores

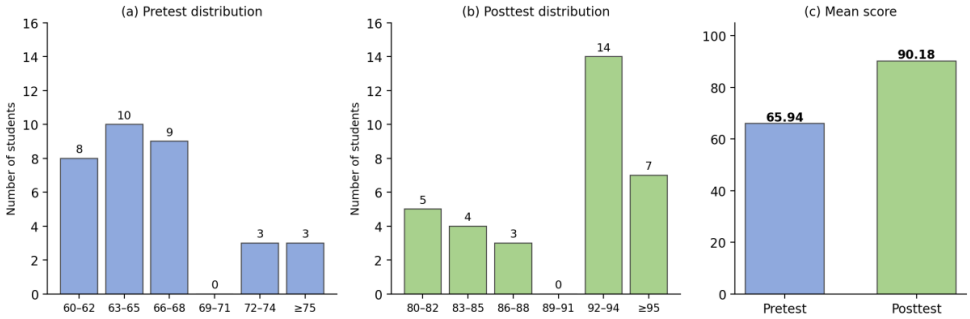
Statistics	Pretest	Posttest
Students Number	33	33
Minimum Score	60	80
Maximum Score	76	100
Average	65,94	90,18
N-Gain Average	0,7144 (high)	

Graph 1 shows that, at the class level, the mean critical thinking score was higher after learning with PESONA than before.



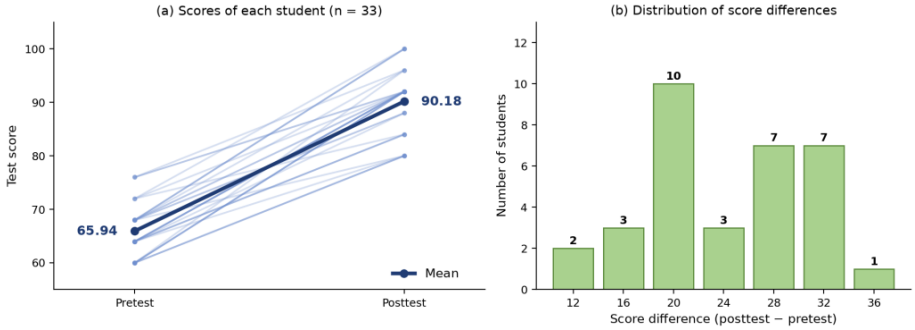
Graph 1. Comparison of Mean Pretest and Posttest Scores

The score distribution showed a clear shift (Graph 2). Pretest scores were concentrated in the 60–68 range (27 of 33 students), whereas most posttest scores fell within the 92–100 range (21 of 33 students, or 63.64%).



Graph 2. Distribution of Pretest and Posttest Scores and Comparison of Mean Scores (n = 33)

All students showed an increase in their scores (Graph 3). The smallest increase was 12 points (two students), while the largest was 36 points (one student). An increase of 20 points was the most common, occurring among 10 students.



Graph 3. Changes in Individual Students' Scores from Pretest to Posttest and Distribution of Score Differences (n = 33)

DISCUSSION

The findings indicate that the PBL-based PESONA application meets the criteria for validity, feasibility, and effectiveness. Validity is a prerequisite in development research because it indicates that a product is aligned with theory, user needs, and learning objectives (Nieveen, 1999; Plomp & Nieveen, 2013). In the ADDIE model, expert validation is conducted during the Development stage to allow product deficiencies to be addressed before implementation (Branch, 2009). The score of 4.58, or 91.53%, from the three validators indicates that the linguistic aspects, content substance, and technical quality are adequate. The subject matter expert's percentage (84%) was the lowest among the three validators, suggesting that content refinement and greater case diversity remain relevant areas for future development.

User responses further support the feasibility of the product. The two teachers rated the application as very good, while students gave percentages ranging from 87.73% to 96.40% across the four questionnaire indicators, with learning interest and motivation receiving the highest score. This finding is consistent with the view that student engagement is multidimensional, encompassing behavioral, emotional, and cognitive dimensions (Fredricks et al., 2004), and that the game elements and quizzes in PESONA may address all three. Sarji and Mampouw (2022) also considered educational games suitable for junior high school students. The feasibility and ease-of-use indicators received relatively lower scores. Since operating the application was still unfamiliar to some students, an introductory session and a user guide are important, consistent with the view that user readiness determines the benefits of technology (Tondeur et al., 2018).

The increase in the mean score from 65.94 to 90.18, with an N-Gain of 0.7144, indicates a high level of improvement among nearly all participants, as no students were in the low category and the minimum score increased from 60 to 80. This finding is consistent with other studies on the development of interactive media aimed at improving critical thinking, such as Android-based multimedia (Hamdani et al., 2022) and Articulate Storyline-based media (Hardiansyah et al., 2026; Legina & Sari, 2022). However, those studies were conducted in science education, whereas the present study examines a similar approach in Social Studies, focusing on the multidimensional topic of social conflict. The distribution of the results is also noteworthy. Every student showed an increase in scores, ranging from 12 to 36 points, with 19 students (57.58%) in the high N-Gain category and 14 students (42.42%) in the moderate category. This pattern suggests that the benefits of the application were not limited to students with a particular level of initial ability but extended to groups with varying initial abilities. On the other hand, the presence of students in the moderate category indicates that the rate of improvement in critical thinking varies among individuals, making continued teacher guidance necessary.

The observations of student understanding further support this finding. The mean understanding score increased from 63.87% to 96.12%, while the number of students in the very good category increased from one to 28. This indicates that changes occurred not only in test scores but also in the learning process, consistent with Fredricks et al.'s (2004) view that cognitive engagement, namely students' sustained effort to understand complex ideas, is an important component of learning engagement. The activities of examining case studies and playing the Monopoly Game in PESONA required students to think continuously throughout the learning process, allowing understanding to develop gradually rather than emerging only during the test.

The improvement cannot be attributed solely to the technology itself. PESONA was designed around the PBL syntax, with each feature serving a pedagogical function. The use of real-world cases positions social conflict as a problem to be understood; group investigations through the materials and case study menus train students to identify causes and impacts; while presentations

and process evaluations provide opportunities to develop arguments and draw conclusions. This sequence is consistent with Hmelo-Silver's (2004) explanation that PBL helps students develop flexible knowledge, problem-solving skills, and collaborative abilities through facilitation. Dolmans et al. (2016) cautioned that PBL can result in either deep or superficial learning, depending on the design of the problems and the quality of facilitation. Therefore, the teacher's role as a facilitator in this study is an integral part of the design rather than an additional component. This design also addresses concerns that technology may be used merely as a shortcut for completing assignments (Kasneci et al., 2023), as the application does not replace the teacher but instead structures learning experiences that require analysis and reflection. The game elements in PESONA should also be understood within the same framework. The Monopoly Game and quizzes serve as tools for reviewing and applying concepts in an enjoyable setting; however, their influence on critical thinking depends on the quality of the questions and cases incorporated into them, just as the outcomes of PBL depend on the quality of problem design (Dolmans et al., 2016).

The preliminary study identified drawing conclusions and providing further explanations as the lowest-scoring indicators. The case studies, exercises, quizzes, and group presentations in PESONA provide specific opportunities to develop both abilities. However, this study reports improvements in overall test scores; therefore, changes in each individual indicator cannot yet be determined and warrant further investigation. Caution in reporting these findings is important to ensure that claims regarding critical thinking do not exceed the available data.

Viewed in a broader context, these results reinforce the general notion that interactive media have the potential to support learning. Hamdani et al. (2022) developed Android-based interactive multimedia to improve critical thinking, Legina and Sari (2022) and Hardiansyah et al. (2026) used Articulate Storyline in science education, and Muttaqin et al. (2021) developed Android-based interactive media for elementary school science. All these studies position interactive media as a means of enriching the learning experience. PESONA differs in its target subject, namely Social Studies, and in its use of social conflict cases that are closely related to students' everyday lives. The application was also designed for offline use to address school conditions in which internet access is not always stable. In the social sciences, Cahyani and Ramli (2026) applied a case-based learning model based on local issues to develop social skills in Social Studies. Although the skills being developed differ, both studies use cases closely related to students' lives as a starting point for learning. This indicates that contextualizing Social Studies content, whether through social issues or environmental issues, as examined by Suhartini and Hamzah (2026), is a recurring strategy worthy of further development.

Compared with media development studies previously published in JKTP, such as a chat novel for teaching forms of social interaction in sociology (Putra et al., 2022) and flip-chart media for elementary school science (Pratiwi et al., 2018), PESONA extends the scope of research to junior high school Social Studies by integrating case studies, games, and PBL syntax into a single offline application and assessing its impact using clearly defined critical thinking indicators. The selection of social conflict is also relevant to the needs of Social Studies, which addresses issues closely related to students' surroundings (Cahyani & Ramli, 2026; Suhartini & Hamzah, 2026). Cases familiar to students are expected to help them connect concepts with their everyday experiences.

From the perspective of educational technology, these findings reinforce the function of media as both a means of conveying messages and a stimulus for student engagement (Arsyad, 2020). The use of technology-based media can indeed improve the quality of learning (Miftah, 2022; Nurmalisa et al., 2023; Septianingsih, 2023), but the findings of this study indicate that such quality is more likely to be achieved when media are designed around clearly defined instructional stages. PESONA

is not intended to replace the teacher; rather, it provides cases, activities, and exercises, while the teacher facilitates discussions, reinforces concepts, and guides reflection. This division of roles is important because media without pedagogical design risk being used merely as a means of completing assignments (Kasneci et al., 2023).

Practically, this application offers an alternative medium for Social Studies that can operate without a stable internet connection, although its use still depends on teacher readiness. Media development needs to be accompanied by efforts to strengthen teachers' digital competencies so that applications are used to develop reasoning rather than merely present information (Edi, 2025; Septianingsih, 2023). Theoretically, this study demonstrates that designing media in alignment with PBL syntax can provide a basis for connecting technology with critical thinking objectives.

This study has several limitations. The one-group pretest–posttest design did not include a control group; therefore, the increase in scores cannot be attributed solely to the application, as the learning process, teacher guidance, and familiarity with taking tests may also have contributed. The study was conducted in only one class at one school over a limited period, so the findings cannot yet be generalized. Future studies are recommended to employ a quasi-experimental design with a control group, analyze changes in each critical thinking indicator, and examine the sustainability of the effects over a longer period. The data analysis was also limited to descriptive statistics and N-Gain; therefore, the statistical significance of the score differences was not tested, and indicator-level analyses were not conducted.

CONCLUSION

The PBL-based PESONA application developed using the ADDIE model was rated very valid and feasible, based on an expert validation score of 91.53%, and received very positive responses from teachers and students. The use of the application for the topic of social conflict in Grade VIII at SMP Negeri 44 Bandar Lampung was accompanied by an increase in the mean critical thinking score from 65.94 to 90.18, with an N-Gain of 0.7144 (high category). These findings indicate that the application is a feasible and effective Social Studies learning medium for improving junior high school students' critical thinking skills. Given that this study involved only one group without a control group, future research is recommended to evaluate the application using a quasi-experimental design, analyze each critical thinking indicator, and expand the study population and subject matter to improve the generalizability of the findings.

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