



Development of problem-based learning mobile learning to improve social literacy skills in elementary schools

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ABSTRACT

This study aims to develop problem-based mobile learning as an additional medium that supports flexible, interactive, and contextual learning processes and can improve the social literacy skills of fourth-grade elementary school students. Mobile learning was chosen as an approach that can meet students' needs for independent learning outside the classroom. This study was conducted in an elementary school in West Java, involving 30 students as research subjects. The method used was research and development (R&D) with the Hannafin & Peck approach, which included the stages of needs assessment, design, development, and implementation. Data collection techniques consisted of observation, interviews, and questionnaires. The results of media feasibility tests by media experts, subject matter experts, and language experts showed very high percentages, namely 90.6%, 90%, and 95.8%, all of which fell into the "highly suitable" category. The user trial (one-on-one) showed a result of 90.8%, which also falls into the "highly suitable for use" category. However, this study only tested the feasibility of mobile learning from the perspective of experts and students, and did not test its effectiveness in improving students' social literacy. Therefore, further research is needed to test the effectiveness of this mobile learning media in improving students' social literacy.

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INTRODUCTION

Individuals living in a community need effective interaction processes to contribute maximally to society. Success in interacting and contributing to society can be achieved if individuals possess good social literacy skills. Social literacy is the ability to use language and communication skills to integrate and apply them in social life (Esti & Novitasari, 2019). Social literacy goes beyond reading; it includes the ability to interact with others and address societal challenges using one's skills and potential. Developing

social literacy is crucial for fostering individuals who can actively and positively contribute to society. Formal development of social literacy can be conducted in schools through structured programs integrated into the curriculum of each educational institution. Social literacy is instilled in elementary school students (SD) through existing subjects such as Science and Social Studies (IPAS) (Rosyida et al., 2024). The objective of IPAS learning is not only to assess cognitive abilities but also to emphasize the importance of application in social and national life through social literacy (Zukmadini et al., 2021). Social literacy as a means for future prospects, empowering individuals to manage their daily lives as independent citizens and actively participate in the democratic process.

The importance of social literacy lies in the ability of individuals to understand and interact with society effectively (Hafni et al., 2018). Understanding the social literacy skills of students helps to determine how students view themselves as an integral part of society. Society encourages deeper understanding and improved critical thinking skills (Ayu, 2017). One way to do this is through problem-based learning (PBL), a form of learning that focuses on existing problems. The PBL approach involves active participation in the educational process by discussing real-world problems using critical thinking, which ultimately increases curiosity (Kusumawati et al., 2022). The implementation of PBL plays a significant role in the independent curriculum with a student-centered learning system, where learning is centered on the students without relying on the teacher as a facilitator (Dentatama & Susanti, 2025; Rusmiati et al., 2023). Learning planning using the PBL approach can build knowledge through discussions in the surrounding environment and collaborative processes to interact with one another to form new understandings (Darwati & Purana, 2021). Through the PBL approach, students not only acquire basic knowledge and skills applicable in daily life but also develop awareness of the social issues they face. As one of the strategies in student-centered learning, PBL aligns with the competencies required for the 4th Industrial Revolution. Various studies indicate that the implementation of PBL enhances critical thinking skills, promotes tolerance and discipline, stimulates curiosity, and develops collaboration and interaction skills necessary for problem-solving literacy and social attitudes (Gede et al., 2022; Mochamad et al., 2023; Nasrikin et al., 2023; Tusriyanto et al., 2022). This PBL learning model not only focuses on cognitive abilities but also on the development of attitudes and skills to achieve maximum learning outcomes.

The PBL learning model is applied to the learning process but can be realized through learning media, namely mobile learning. Mobile learning is a flexible learning medium that enables interaction and communication between teachers and students based on their needs (Kim et al., 2017; Linda et al., 2020). The presence of mobile learning complements the learning process by providing students with the opportunity to learn anytime and anywhere (Díaz-Sainz et al., 2021; Domingo & Garganté, 2016; Hao et al., 2019; Mayer, 2020). The implementation of mobile learning not only supports flexibility in terms of time but also promotes interactivity and independence among students (Milanti et al., 2023; Riana & Elmunsyah, 2024). Mobile learning can be conducted in groups (Imania & Bariah, 2020; Nikmah et al., 2020). Mobile learning serves as a tool for evaluation and reinforcement, allowing students to review learning material without teacher supervision (Darmaji et al., 2024). The availability of mobile learning media enables students to repeatedly access material they have not yet understood (Mardiyanto & Annggara, 2025; Sugandi et al., 2024). The implementation of mobile learning has the potential to enhance active collaboration between students and teachers (Lintjewas et al.,

2022; Muhammad & Yuliani, 2023; Radita & Nurfauziah, 2022). The implementation of mobile learning improves the quality of learning by creating a flexible learning experience tailored to the needs of students.

Based on observations at the school, several problems were found in the IPAS learning process in the classroom. First, the use of learning media at the school has been done using YouTube videos and PowerPoint presentations. The use of YouTube videos tends to be passive, the language used is too advanced, the material is not in line with the learning outcomes and learning objectives, and the use of images, material, and examples in YouTube videos is not adapted to the curriculum and characteristics of the students. Second, the use of PowerPoint presentations (PPT) presented in PPT only copies from books in a concise manner without relating them to real-life situations, so the material presented is still not fully understood by the students.

Second, during the learning process, teachers sometimes relate lesson materials to everyday situations, but this needs to be improved by providing concrete examples relevant to the students' environment to make it easier for them to understand and connect the material to real-life experiences. In terms of presentation skills, many students still feel nervous, lack confidence, and are tense in front of the class.

Third, the teaching methods used by teachers are mostly individual and do not often involve group discussions. As a result, students rarely discuss social issues in their environment with their friends. However, group discussions are very important for training cooperation, critical thinking, and the ability to express opinions.

Fourth, social issues that arise in the school environment, such as excessive jokes and differences of opinion, self-understanding, some students are already able to recognize their feelings and express their opinions, although some are still quiet and find it difficult to express their feelings.

Fifth, there are still obstacles in the implementation of learning activities, namely that some students tend to be passive, do not express their opinions, and do not respond to questions from teachers. This is due to limited understanding of IPAS material, as it is only introduced in fourth grade and was not covered in previous grades. Additionally, some students have not yet developed the self-awareness to actively participate in group discussions. This is evident when teachers divide students into discussion groups, as not all students participate, instead relying on peers perceived to have a better understanding.

Based on the field findings, an alternative solution to these problems is to develop PBL-based mobile learning. The mobile learning product developed has a novelty in terms of instilling social literacy in students. An interactive learning environment serves as a means of interaction between teachers and students to communicate directly and respond to every interaction that occurs within the learning application (Azmi & Ummah, 2023; Nuranti et al., 2023). By developing students' social literacy, they are able to interact, collaborate, and build effective communication in the learning environment. Similar to previous research, based on the results of the preliminary study, the social literacy indicators that need to be improved by fourth-grade students include identifying problems, writing down what is understood from the available information, distinguishing between facts and opinions, communicating what happened and its consequences, determining what is correct and what is incorrect before making decisions, collaborating in groups, respecting others' rights, caring for peers, accepting differences, and sharing opinions and stories with friends. Therefore, the development of PBL-based mobile learning is needed to improve students' social literacy skills. Mobile learning is designed

as an innovative product, especially in the IPAS teaching and learning process for fourth-grade students.

METHOD

This study uses a Research and Development (R&D) design based on the Hannafin & Peck model, which includes the stages of needs assessment, design, development, and implementation. The goal is to create educational media in the form of PBL-based mobile learning that is suitable for classroom use. The subjects of this study involved 30 fourth-grade students. Data collection techniques included observation, interviews, and the distribution of questionnaires. The feasibility of the product was determined based on the results of product validity testing based on media experts, material experts, and language experts. In addition, there is user testing consisting of one-to-one, small group, and field tests. The calculation of user testing uses the following formula:

$$P = \frac{\sum x}{\sum i} \times 100$$

Description:

P = total score

$\sum x$ = total number of respondents' answers in all items

$\sum i$ = total ideal score per item

RESULT AND DISCUSSION

This research was conducted to develop PBL-based mobile learning using the Hannafin and Peck model. The Hannafin and Peck model is a teaching design model consisting of three stages. The three stages of the Hannafin and Peck development model are: 1) Need assessment; 2) Design; and 3) Development & implementation. In this model, assessment and repetition need to be carried out in each phase.

Need Assesment

The questionnaire revealed key insights into the IPAS learning process for fourth-grade students, such as first, based on the questionnaire results, the social literacy score analysis showed 54.43%, which falls into the social literacy category filled out by the students. There are 8 social skills indicators that are still categorized as low, including students who are unable to ask questions to understand the issues occurring around them, unable to distinguish between what is correct and what is an opinion, and unable to say "I don't know." they are not yet accustomed to asking questions first to know what is right and wrong, they are not yet able to respect their friends' opinions even if they differ, they are not yet fully able to listen to their friends' stories when they speak, they are not yet comfortable interacting with new friends, they are not yet accustomed to trying to resolve problems with friends by talking it out, and many are still unable to express their opinions or feelings to friends or teachers. The two researchers conducted a preliminary study to understand IPAS learning activities in schools that occur indirectly, focusing more on cognitive aspects. However, the success of students is not only about knowledge but also about being able to interact, communicate, and contribute, which can be achieved if individuals possess good social values. Thirdly, the selection of mobile learning as a medium to support the improvement of social literacy, as seen from the results of the needs analysis questionnaire, with 76.6% of students choosing *mobile learning* as a support for the learning process. This selection was based on the fact that it is easy to understand the material through repetition, which is not only It is done at school, but students can also study at home, and there are no restrictions on space and time. Fourth, the learning approach involves activities that are not far from the real lives of students,

based on the results of a questionnaire, with 65.4% of teachers using this approach. This approach was chosen to stimulate students' curiosity about issues that are not far from their daily lives, so that they can be understood by students.

Design

The second stage of this development focused more on addressing the learning gaps that occurred in the previous stage, which were then incorporated into the learning media design. The design created by the researcher was first consulted with the supervising lecturer to receive input in order to perfect the product being developed.

Develop and Implement

The third stage involves development and implementation, which includes activities such as integrating, developing, and creating new learning programs. The developed products are then validated by experts, and the media and materials are tested with students through *one-to-one* trials. The following images show the *mobile learning* media developed by researchers based on feedback from experts and students, as shown in the image.



Figure 1. Initial Display

After the PBL-based *mobile learning* media that had been developed was tested by expert validation, namely media experts, subject matter experts, language experts, and one-to-one testing with fourth-grade students using a questionnaire instrument. Based on the results obtained from the media expert, the percentage was 90.6% with the category of “very suitable,” but at this stage, the media expert suggested adding an application description on the splash screen (opening screen), increasing the number of learning guide buttons, and making it easier for users. The results of the content expert validation showed a percentage of 90% with the category of “very suitable” and no revisions were needed. The validation results from the language expert showed a percentage of 95.8% in the “very suitable” category for use in mobile learning media. Additionally, the one-to-one testing results showed a percentage of 90.8% in the “very suitable” category, but students suggested that the instructions be adjusted as they were too bright for those wearing glasses. These results indicate that the PBL-based mobile learning media developed is highly suitable for use. The data obtained will be presented in more detail in the following table.

Table 1. Media Validation Results

No.	Assessment Aspects	ore Criteria	Score Points	Percentage
1.	Software	28	23	82,1%
2.	Learning Design	20	19	95 %
3.	Visual Communication	16	16	100%
Average				90,6%
Eligibility Category				Highly Recommended

Table 2. Material Validation Results

No.	Assessment Aspects	Criteria	Score	Percentage
1.	Presentation of Material	8	8	100%
2.	Material Truth	20	18	90%
3.	Presentation Suitability	12	10	83,3%
4.	<i>Problem-Based Learning</i>	20	18	90%
Average				90%
Eligibility Category			Highly Recommended	

Table 3. Language Validation Results

No.	Assessment Aspects	Score Criteria	Score Points	Percentage
1.	Language Suitability	16	15	93,7%
2.	Language Sequence	12	11	91,6%
3.	Use of Language	20	20	100%
Average				95,8%
Eligibility Category			Highly Recommended	

Table 4. One-to-one Results

No.	Assessment Aspects	Score Criteria	Score Points	Percentage
1.	Media display design	48	44	91,6%
2.	Language Suitability	24	22	91,6%
3.	Presentation of Material	24	20	83,3%
4.	Advantages of Media	24	23	95,8%
Average				90,8%
Eligibility Category			Highly Recommended	

Based on the results of the validation test and *one-to-one* comparison, it can be concluded that PBL-based *mobile learning* is very feasible for use in IPAS learning in fourth grade elementary school.

Discussion

The research and development section produced a PBL-based *mobile learning* application for fourth grade elementary school students. PBL-based *mobile learning* can be used by teachers as an additional learning medium. The development of PBL-based mobile learning is intended to create engaging learning media during the IPAS learning process in fourth grade and to enhance social literacy. Recognizing mobile learning as a technology-integrated learning medium with long-term potential in education, the researcher developed this as an interactive and contextual learning support material. Mobile learning was developed using the PBL approach because the application of problem-based learning in elementary schools is still limited, even though it can train students to think critically, work together, and solve problems experienced in social environments. To achieve these objectives, the researcher developed PBL *mobile learning* through a validation process involving experts and students to test whether the developed media is suitable for use in elementary schools. The validation conducted by the researcher involved expert validation of the media and content, as well as student validation as an idealistic assessment to ensure the alignment of theory and design. Meanwhile, student validation was conducted to assess practical responses and ensure the product aligns with students' learning needs.

The development of PBL-based *mobile learning* for fourth-grade IPAS subjects has shown results that are very feasible for implementation in the learning process. Visual communication is one of the aspects that has been considered in the development of PBL-based mobile learning. Visual communication is designed to be attractive through a bright and consistent initial media display and a simple layout through the initial media display

when opening the application. Typography in the media must use fonts that are easy to read without adding decorative strokes that can complicate the text. The suitability of image size and resolution is a concern in development. Learning content illustrations use contextual illustrations that relate social issues to the real-world situations of students to facilitate the situations that must be solved. Icons are designed to be simple and uncomplicated, with a pavilion image to return to the next menu and main navigation icons for “next” and “back” in every PBL-based *mobile learning* media application, making them easily recognizable by elementary school-aged children. Image explanations are accompanied by clear, concise text to help learners understand the material easily. This indicates that *mobile learning* with attractive visual communication, whose application is easy to use and simple, becomes an attractive feature in learning (Aditia & Aditia, 2024; Chandra et al., 2022; Musthofa et al., 2025; Sumarsono & Sugiyanto, 2019). The occurrence of interaction processes that generate feedback (Pamungkas, 2020; Rahmat, 2020; Rizki et al., 2024) can stimulate the sense of sight (Cahyani et al., 2024; Rahmi & Alfurqan, 2021; Vina et al., 2022).

Not only visual communication aspects, *mobile learning* development is also seen in terms of language and content. The use of language in communication is very important to consider in accordance with the cognitive abilities of students. Language development in students aged 9-12 years in upper grades has mastered around 80,000 words. Language development continues to evolve in line with the developmental stages of students. At this stage, development can be observed in terms of physical, cognitive, socio-emotional, moral, and language aspects. Language development in school-aged learners is faster because the brain functions of learners are developing at this stage, making it easier for children to learn language (Aslamiyah et al., 2024; Zega & Suprihati, 2021). The clarity of language in providing instructions through text in the application must be clear and unambiguous to support contextual learning processes (Ika Febriana et al., 2024; I. Muhammad et al., 2022). In addition, consistency in the use of terminology in the material is very important to facilitate students' understanding of the learning content (Lestari et al., 2023; Salsabila & Susantini, 2022). The material developed must take into account the learning outcomes and learning objectives that have been set. In the learning objectives section, teachers can determine the sequence according to the needs of the students. Accuracy in presenting the material must be considered in the development of PBL-based mobile learning. The material must be adapted to the concepts and field facts, presented from easy to difficult, and complemented with the developed media.

Mobile learning media is designed using a PBL approach that focuses on problems that can be solved individually and in groups. Based on previous research (S. Muhammad & Henny, 2021; Nofita et al., 2023; Noni et al., 2022), *mobile learning* can improve students' critical thinking skills. Critical thinking skills can be improved through effective learning methods (Sae & Radia, 2023; Sayangan et al., 2024). Previous studies have demonstrated the success of PBL-based *mobile learning* in improving academic performance (Mochamad et al., 2023) Furthermore, research (Suryadin & Arifin, 2020) applying cooperative learning through picture and picture activities has positive effects on students' social literacy skills, aimed at improving test scores in the second cycle. Additionally, research (Artia et al., 2023) indicates that social literacy can assist students in understanding concepts. The implementation of *mobile learning* holds potential for enhancing active collaboration between students and teachers (Lintjewas et al., 2022; Radita & Nurfauziah, 2022). This indicates that mobile learning is not merely a

supplementary learning tool but a necessity in creating flexible learning environments that do not restrict students' learning space and time.

The research on PBL-based *mobile learning* development has limitations, namely that it is still limited to product feasibility testing. The hope is to continue research that measures the effectiveness of social literacy skills in fourth-grade elementary school students in IPAS subjects.

CONCLUSION

The development of PBL-based mobile learning aims to produce additional media that supports students in learning IPAS in the fourth grade of elementary school. In addition, the development of PBL-based mobile learning is expected to improve students' social literacy skills. The *mobile learning* that has been developed is very suitable for use in the learning process based on the results of expert and student assessments. The selection of visual communication, learning design, presentation of materials, use of language in instructions, and consistency of terminology can serve as the foundation for PBL-based *mobile learning* to be highly suitable for use in the learning process. The development of this product is still limited to feasibility testing; it is hoped that future researchers will be able to measure its effectiveness and the improvement in students' social literacy.

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