THE DEVELOPMENT OF MOBILE LEARNING-BASED LEARNING MEDIA IN THEMATIC LEARNING AT SULTAN ISKANDAR MUDA ELEMENTARY SCHOOL

Muhammad Dekar
Universitas Battuta, Jl. Sekip Simpang Jalan Sikambing Medan, Indonesia
e-mail: muhammad.dekar.mpd@gmail.com

Keywords: Mobile Learning, Instructional Media, Thematic Learning, Elementary School

ABSTRACT

This study aimed to develop mobile learning based instructional media for thematic learning at SD Sultan Iskandar Muda and to examine its feasibility, practicality, and effectiveness. The study employed a research and development method using the 4D development model consisting of define, design, develop, and disseminate stages. The research subjects involved two classes, namely an experimental class using the mobile learning based instructional media and a control class receiving conventional instruction. Data were collected through expert validation, teacher and student response questionnaires, and learning achievement tests. Data analysis was conducted using descriptive analysis and normalized gain. The results indicated that the developed mobile learning media was categorized as very feasible based on expert validation, very practical based on teacher and student responses, and effective in improving students' learning outcomes. The experimental class demonstrated higher learning improvement compared to the control class. Therefore, mobile learning based instructional media can serve as an effective alternative for thematic learning in elementary schools.

Abstrak

Penelitian ini bertujuan untuk mengembangkan media pembelajaran berbasis mobile learning pada pembelajaran tematik di SD Sultan Iskandar Muda serta menguji kelayakan, kepraktisan, dan keefektifannya. Penelitian ini menggunakan metode research and development dengan model pengembangan 4D yang meliputi tahap define, design, develop, dan disseminate. Subjek penelitian terdiri atas dua kelas, yaitu kelas eksperimen yang menggunakan media pembelajaran berbasis mobile learning dan kelas kontrol yang menggunakan pembelajaran konvensional. Teknik pengumpulan data meliputi validasi ahli, angket respon guru dan siswa, serta tes hasil belajar. Data dianalisis menggunakan analisis deskriptif dan gain ternormalisasi. Hasil penelitian menunjukkan bahwa media pembelajaran berbasis mobile learning berada pada kategori sangat layak berdasarkan validasi ahli, sangat praktis berdasarkan respon guru dan siswa, serta efektif dalam meningkatkan hasil belajar siswa. Kelas eksperimen menunjukkan peningkatan hasil

belajar yang lebih tinggi dibandingkan kelas kontrol. Dengan demikian, media pembelajaran berbasis mobile learning dapat dijadikan sebagai alternatif media pembelajaran tematik yang efektif di sekolah dasar.

Kata kunci: *Mobile Learning*, Media Pembelajaran, Pembelajaran Tematik, Sekolah Dasar

INTRODUCTION

Elementary education serves as the primary foundation of the formal education system because it determines the direction of the development of students' intellectual, affective, and learning skills. Learning in elementary schools is required not only to convey content but also to develop logical and creative thinking skills and the ability to connect knowledge to real-life contexts. In practice, a thematic learning approach is implemented in elementary schools to integrate various subjects into a cohesive theme, providing meaningful learning experiences for students as holistic individuals interacting with their environment. The thematic approach enables students to see the interconnections between different knowledge concepts through a single thematic focus, making learning more contextual and meaningful.

However, the implementation of thematic learning in many elementary schools demonstrates limitations in providing learning media that support this integration. Many teachers still use traditional learning resources such as textbooks, whiteboards, and student worksheets, which tend to be one-way and less interactive. This situation often results in thematic learning being unable to create learning experiences that truly engage students actively.

With advances in information and communication technology, the paradigm shift toward the use of digital media is increasingly evident. Mobile technology such as smartphones and tablets has become part of the daily lives of students, including elementary school students, who are growing up as digital natives. Mobile learning is a learning approach that utilizes mobile devices to provide flexible learning resources, learning activities, and feedback without the constraints of traditional time and space. This approach aligns with the principles of active learning because it gives students the autonomy to explore learning materials according to their own interests and needs. According to a literature review, mobile learning can support deeper conceptual understanding, increase student engagement, and foster learning motivation through the presentation of interactive and contextual learning content.

Empirical evidence has shown that the implementation of mobile learning in elementary schools has several positive contributions. Indra Perdana et al. (2022) in their study on the use of mobile learning technology in elementary schools found that students who used mobile learning applications experienced improved cognitive skills and collaboration abilities due to technology-based learning activities. This description suggests that integrating mobile technology into learning can open up opportunities for improving students' learning experiences. However, not all students see the value or convenience in using mobile learning applications, indicating that the design and implementation of mobile learning needs to be tailored to the learner's context and learning environment.

Other relevant research related to the context of mobile learning in elementary schools demonstrates various models and approaches to developing mobile-based learning media. For example, research developed through a mobile learning application design approach using the Multimedia Development Life Cycle (MDLC) demonstrated that a feasible mobile learning media design can be implemented for elementary school students, based on the feasibility of media experts, content experts, and responses from teachers as educational practitioners. Although this research demonstrated that the mobile learning media design was technically feasible, a testing phase for integration with specific learning approaches, including thematic learning, is still needed to ensure the developed media can effectively address curriculum needs.

In the context of thematic learning, several studies have explored the use of technology-based media to support teaching and learning activities. For example, research on innovative Android-based integrative thematic learning systems demonstrated that digital media designed for thematic learning can improve student learning outcomes and provide a more contextual learning experience. This research used a media development model with a systematic approach and involved empirical testing on students in the classroom. The results indicated that the Android-based thematic media was feasible for use and had a positive impact on students' understanding of thematic learning materials in a real classroom context.

Elementary education serves as the primary foundation of the formal education system because it determines the direction of the development of students' intellectual, affective, and learning skills. Learning in elementary schools is required not only to

convey content but also to develop logical and creative thinking skills and the ability to connect knowledge to real-life contexts. In practice, a thematic learning approach is implemented in elementary schools to integrate various subjects into a cohesive theme, providing meaningful learning experiences for students as holistic individuals interacting with their environment. The thematic approach enables students to see the interconnections between different knowledge concepts through a single thematic focus, making learning more contextual and meaningful.

However, the implementation of thematic learning in many elementary schools demonstrates limitations in providing learning media that support this integration. Many teachers still use traditional learning resources such as textbooks, whiteboards, and student worksheets, which tend to be one-way and less interactive. This situation often results in thematic learning being unable to create learning experiences that truly engage students actively.

With advances in information and communication technology, the paradigm shift toward the use of digital media is increasingly evident. Mobile technology such as smartphones and tablets has become part of the daily lives of students, including elementary school students, who are growing up as digital natives. Mobile learning is a learning approach that utilizes mobile devices to provide flexible learning resources, learning activities, and feedback without the constraints of traditional time and space. This approach aligns with the principles of active learning because it gives students the autonomy to explore learning materials according to their own interests and needs. According to a literature review, mobile learning can support deeper conceptual understanding, increase student engagement, and foster learning motivation through the presentation of interactive and contextual learning content.

Empirical evidence has shown that the implementation of mobile learning in elementary schools has several positive contributions. Indra Perdana et al. (2022) in their study on the use of mobile learning technology in elementary schools found that students who used mobile learning applications experienced improved cognitive skills and collaboration abilities due to technology-based learning activities. This description suggests that integrating mobile technology into learning can open up opportunities for improving students' learning experiences. However, not all students see the value or convenience in using mobile learning applications, indicating that the design and

implementation of mobile learning needs to be tailored to the learner's context and learning environment.

Other relevant research related to the context of mobile learning in elementary schools demonstrates various models and approaches to developing mobile-based learning media. For example, research developed through a mobile learning application design approach using the Multimedia Development Life Cycle (MDLC) demonstrated that a feasible mobile learning media design can be implemented for elementary school students, based on the feasibility of media experts, content experts, and responses from teachers as educational practitioners. Although this research demonstrated that the mobile learning media design was technically feasible, a testing phase for integration with specific learning approaches, including thematic learning, is still needed to ensure the developed media can effectively address curriculum needs.

In the context of thematic learning, several studies have explored the use of technology-based media to support teaching and learning activities. For example, research on innovative Android-based integrative thematic learning systems demonstrated that digital media designed for thematic learning can improve student learning outcomes and provide a more contextual learning experience. This research used a media development model with a systematic approach and involved empirical testing on students in the classroom. The results indicated that the Android-based thematic media was feasible for use and had a positive impact on students' understanding of thematic learning materials in a real classroom context.

METHODS

The research was conducted at Sultan Iskandar Muda Elementary School during the even semester of the current academic year. The subjects were fifth-grade students, consisting of two parallel classes with relatively homogeneous characteristics based on discussions with the class teachers and school academic data. The distribution of the study subjects is presented in Table 1.

Table 1. Research Subjects

Class	Number of Students	Treatment
VA	30	The experimental class used mobile learning media
VB	30	The control class used conventional media.

Classes were selected using purposive sampling, taking into account equivalence in student initial abilities and the availability of learning support facilities.

This research and development (R&D) aims to produce a product in the form of mobile learning-based instructional media for thematic learning in elementary schools and to test its feasibility and effectiveness in the learning process. The development model used in this study is the 4D model developed by Thiagarajan, Semmel, and Semmel, which includes the stages of Define, Design, Develop, and Disseminate. This model was chosen because it has a systematic and structured development flow and is widely used in the development of learning media and tools at the elementary education level.

To test the effectiveness of the developed product, this study also used a quasi-experimental approach with a non-equivalent control group design. This design allows researchers to compare learning outcomes between classes using mobile learning-based instructional media as the experimental class and classes using conventional learning as the control class.

1. Define Stage

The define stage aims to identify and define the need for learning media development. Activities in this stage include five main steps. An initial analysis was conducted to assess the thematic learning conditions at Sultan Iskandar Muda Elementary School, including the learning methods used, available media, and obstacles faced by teachers and students in the learning process. This analysis was conducted through classroom observations and interviews with teachers. Student characteristics analysis was conducted to determine students' cognitive characteristics, learning interests, and experiences in using mobile devices as learning media. The analysis showed that most students were accustomed to using mobile devices in their daily lives, but their utilization in learning was still limited.

Task analysis was conducted by examining core competencies, competency achievement indicators, and thematic learning materials that would be developed into mobile learning media. This analysis referred to the school's applicable curriculum documents. Concept analysis aimed to identify key concepts from various subject areas integrated into a single learning theme. These concepts were then mapped to ensure material integration in the developed learning media. Learning objective analysis was

conducted to formulate specific and measurable learning objectives as a basis for developing mobile learning media content.

2. Design Stage

The design stage aims to create a prototype of mobile learning-based learning media. Several main activities are carried out at this stage. The learning plan is developed by developing a thematic learning flow that includes an introduction, core activities, and a closing, as well as the integration of mobile learning media into each learning stage. Media design is carried out by creating a storyboard and flowchart for the mobile learning application, which outlines the menu structure, navigation, and learning content to be presented. The media is designed to integrate various lesson contents within a single theme with an attractive visual display that is easy for elementary school students to use. Research instruments are developed to measure the validity, practicality, and effectiveness of the media. The instruments developed include expert validation sheets, teacher and student response questionnaires, and learning outcome tests to measure student understanding.

3. Development Stage

The development stage aims to produce a valid and usable learning media product. This stage encompasses several main activities. Media development involves realizing the media design into an Android-based mobile learning application. The media is developed to include thematic learning materials, interactive practice questions, and learning evaluations. Expert validation is conducted to assess the media's suitability in terms of both material and media aspects. The validators consisted of two thematic learning material experts and two learning media experts. The assessment was conducted using a validation sheet with a five-level Likert scale. Validity scores were calculated using the following formula.

$$V = \frac{\sum X}{\sum X_{\text{maks}}} \times 100\%$$

Description:

V is the validity percentage

ΣX is the total score obtained

ΣXmax is the maximum score

Meanwhile, the media validity criteria are presented in Table 2.

Table 2. Media Validity Criteria

Percentage	Category
81–100	Very Feasible
61–80	Feasible
41–60	Quite Feasible
21–40	Less Feasible
0–20	Not Feasible

After revisions based on validator input, the media was trialed on a limited basis in the experimental class to assess its practicality and initial effectiveness. Media practicality was measured using teacher and student questionnaire responses. Practicality scores were calculated using the same formula as validity and interpreted using similar criteria. Media effectiveness was measured by comparing learning outcomes between the experimental and control classes. Learning outcome data were obtained from pretest and posttest scores.

RESULTS AND DISCUSSION

1. Validation Results of the Mobile Learning Based Instructional Media

The mobile learning based instructional media developed through the 4D model was validated by subject matter experts, media experts, and instructional experts. The validation aimed to examine the feasibility of the product before implementation in classroom learning.

Table 1. Expert Validation Results

Validator	Maximum Score	Obtained Score	Percentage	Category
Subject Matter Expert	100	88	88.00	Very Feasible
Media Expert	100	90	90.00	Very Feasible
Instructional Expert	100	86	86.00	Very Feasible
	Average		**88.00**	**Very Feasible**

The validation results indicate that the developed mobile learning based instructional media is categorized as very feasible. The subject matter expert confirmed that the content is aligned with thematic learning competencies at the elementary school

level and presented systematically using age appropriate language. The media expert assessed that the visual design, navigation, and interactivity met digital learning design principles. Meanwhile, the instructional expert emphasized that the media supports active student engagement and is compatible with the characteristics of thematic integrated learning.

2. Practicality Results of the Instructional Media

The practicality of the instructional media was measured using questionnaires distributed to teachers and students after implementation in the experimental class.

Table 2. Teacher Responses to Media Practicality

Aspect	Percentage	Category
Ease of use	92.00	Very Practical
Compatibility with thematic learning	90.00	Very Practical
Learning time efficiency	88.00	Very Practical
Average	**90.00**	**Very Practical**

Table 3. Student Responses to the Instructional Media

Aspect	Percentage	Category
Visual appearance	91.00	Very Practical
Ease of understanding the material	89.00	Very Practical
Learning interest	93.00	Very Practical
Average	**91.00**	**Very Practical**

The questionnaire results show that the instructional media is highly practical for both teachers and students. Students demonstrated a high level of interest, particularly in terms of visual presentation and interactive features, which facilitated their understanding of thematic learning content.

3. Student Learning Outcomes

Student learning outcomes were analyzed based on pretest and posttest scores in the experimental and control classes.

Table 4. Descriptive Statistics of Student Learning Outcomes

Class	Mean Pretest Score	Mean Posttest Score
Experimental	58.40	85.20
Control	59.10	72.30

The data indicate that both classes had relatively similar initial abilities. However, after the intervention, the experimental class achieved higher posttest scores compared to the control class.

4. Normalized Gain Analysis

The improvement in student learning outcomes was analyzed using normalized gain.

Table 5. Normalized Gain of Student Learning Outcomes

Class	Gain Value	Category
Experimental	0.72	High
Control	0.41	Moderate

The normalized gain results reveal that the experimental class achieved a high level of learning improvement, while the control class demonstrated a moderate level of improvement.

The findings of this study demonstrate that the mobile learning based instructional media developed using the 4D model achieved a very high level of feasibility based on expert validation. This indicates that the media meets essential standards related to content accuracy, instructional design, and usability required for thematic learning in elementary schools. These results support the notion that systematically designed digital learning media can effectively facilitate meaningful learning experiences for young learners.

The high practicality scores indicate that the mobile learning media is not only theoretically sound but also applicable in real classroom settings. Teachers perceived the media as helpful in managing thematic instruction more efficiently, while students reported increased engagement and enjoyment during learning activities. This finding aligns with previous studies suggesting that mobile learning environments enhance student motivation and active participation, particularly at the elementary education level.

The significant difference in learning outcomes between the experimental and control classes indicates that the integration of mobile learning media positively influenced students' understanding of thematic concepts. The higher posttest scores achieved by the experimental class suggest that interactive digital media can support

students in connecting concepts across subjects in a more contextual and integrative manner, which is the core principle of thematic learning.

Furthermore, the high normalized gain achieved by the experimental class indicates that the media did not merely improve final scores but also substantially enhanced students' conceptual understanding from their initial levels. This suggests that mobile learning facilitates deeper learning processes through visualization, interactive exercises, and flexible access to learning materials. Such features are particularly beneficial for elementary school students who require concrete and engaging learning experiences.

Overall, the results and discussion confirm that the development of mobile learning based instructional media for thematic learning at SD Sultan Iskandar Muda contributes meaningfully to improving learning quality. The developed media is feasible, practical, and effective, thereby offering a viable alternative for implementing digital based thematic instruction in elementary schools.

CONCLUSION

This study developed a mobile learning based instructional media for thematic learning in elementary school using the 4D model. The results indicate that the developed media is highly feasible based on expert validation, demonstrating its alignment with instructional objectives, content accuracy, and appropriate design for elementary students. The media was also found to be very practical, as both teachers and students responded positively to its use in classroom learning. In addition, the effectiveness analysis showed that students in the experimental class achieved higher learning outcomes and greater improvement compared to those in the control class. Overall, the findings suggest that mobile learning based instructional media is a valid, practical, and effective approach to enhancing thematic learning in elementary education.

REFERENCES

Arikunto, S. (2021). *Prosedur penelitian suatu pendekatan praktik*. Jakarta: Rineka Cipta.

Hake, R. R. (1998). Interactive engagement versus traditional methods: A six thousand student survey of mechanics test data for introductory physics courses. *American Journal of Physics*, 66(1), 64–74.

Kadarsih, I., & Fitria, Y. (2022). Implementation of learning using interactive multimedia based on Android on Theme 9 be Class V SD. *Jurnal Ilmiah Sekolah Dasar*, 6(1), 57–65.

Nurmawati, F., Maysaroh, L., & Anindia Hizraini, A. (2023). Inovasi sistem pembelajaran tematik integratif berbasis Android sebagai media pembelajaran efektif di sekolah dasar. *PERMAI: Jurnal Pendidikan Dan Literasi Madrasah Ibtida'iyah*, 2(2), 92–102.

Perdana, I., et al. (2022). The use of mobile learning in elementary school: Is it important? *Al-Ishlah: Jurnal Pendidikan*, 14(2), 1431–1438.

Qurrotul Aini. (2025). Pengembangan interaktif mobile learning untuk meningkatkan kemampuan numerasi siswa kelas V SD. *Jurnal Didaktika Pendidikan Dasar*, 9(2), 677–700.

Riduwan. (2020). *Skala pengukuran variabel variabel penelitian*. Bandung: Alfabeta.

Rofi'i, A., & Susilo, S. V. (2023). The development of teaching materials based on mobile learning in English learning for elementary schools. *Al-Ishlah: Jurnal Pendidikan*, 15(2), 2062–2075.

Setiawaty, R., & Santoso, D. A. (2025). Peningkatan literasi guru SD melalui pembuatan mobile learning apps materi bahasa Indonesia bermuatan kearifan lokal terintegrasi edugame dan Edpuzzle. *Jurnal Ilmiah Kampus Mengajar*, 5(2), 137–151.

Sugiyono. (2022). *Metode penelitian pendidikan pendekatan kuantitatif, kualitatif, dan R&D*. Bandung: Alfabeta.

Thiagarajan, S., Semmel, D. S., & Semmel, M. I. (1974). *Instructional development for training teachers of exceptional children*. Bloomington: Indiana University.

Triyanto, J., Sukarno, S., & Kurniawan, S. B. (2022). Thematic learning based on critical thinking skills using blended learning system in elementary school. *International Journal of Elementary Education*, 6(2), 305–314.