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Development of Interactive Learning Media Mobile Learning In Science for Class VIII Junior High School

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Abstract: This research focuses on the development of interactive mobile learning media for science subjects in eighth-grade junior high school. The identified problems are the lack of student engagement and the limitations of easily damaged learning media. Additionally, educators face difficulties in using technology in the teaching and learning process. This study uses the research and development (R&D) method with a 4-D model. The product's validity was assessed by six experts—two media experts, two language experts, and two subject matter experts—who rated it as "Highly Valid" with an average percentage of 92%, 89%, and 97%, respectively. The practicality test showed that the media is very practical, with an average percentage of 87% from teachers and 96.7% from students. The effectiveness of the media was measured by the gain score, which showed a value of 0.62, categorized as "Moderate," and the average student learning outcome after using the media was 81.4, categorized as "Very Good." Based on these results, the interactive mobile learning media for science subjects in eighth-grade junior high school has been proven to be valid, practical, and effective in improving student learning outcomes.

Keywords: 4D; Learning media; Mobile learning; Science

Introduction

The issue of education quality is a primary concern in the world of education, addressed through adequate facilities, innovative teaching methods, and the creation of a conducive learning environment. In the National Education System Law No. of the year 2003, education is defined as a conscious and planned effort to develop the potential of learners. In the 21st-century era of globalization, technology plays a key role, and education must adapt to the demands of modern world skills. 21st-century education emphasizes six skills (6C), (Fadhilawati & Malahayati, 2023; Sarip et al., 2024; Shabrina & Astuti, 2022; Uzoamaka, 2021). One of the 21st-century skills is creativity, which poses a challenge as many learners are not yet aware of and haven't developed their creative potential (Alifah & Sukartono, 2023; Rahmawati et al., 2021).

The development of students' creativity can be applied to various subjects, including science (IPA). Science education involves systematically exploring nature, emphasizing not only the mastery of facts, concepts, or principles but also the process of discovery (Ananda & Abdillah, 2018). In the 21st century, particularly in Indonesia, science education tends to focus on teaching as a product rather than a process. Students often memorize concepts without developing the necessary cognitive skills. Data from TIMSS indicates that the science abilities of Indonesian students are below the global average (Kemendikbud, 2015). Amidst the advancements in science and technology, there is a need for a STEM (Science, Technology, Engineering, and Mathematics) approach to develop 21st-century skills (Nazifah & Asrizal, 2022; Okta et al., 2018; Saski & Sudarwanto, 2021; Setiawati et al., 2024; Taqiyyah et al., 2023).

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The STEM-based science education process necessitates instructional media that can support effective and engaging learning, enabling the achievement of learning objectives. Educators, beyond their role as motivators, also serve as facilitators and innovators in developing media that can enhance the learning process. Teachers must be creative and innovative in presenting lesson materials to ensure that students enjoy the learning experience by creating engaging instructional media (Izzah et al., 2023; Jufri et al., 2023; Seechaliao, 2017; Taufik et al., 2024). This approach encourages a high level of interaction and motivates students to learn better in the classroom.

Leveraging instructional media has a significantly positive impact on enhancing the quality of education in a more efficient and effective manner, aiming to support learners in the teaching-learning process. One of the benefits of using instructional media is to enhance the learning experience, making it more tangible and allowing for critical engagement with abstract and complex learning materials (Hidayati, 2018). Instructional media plays a key role as a tool that contributes to improving the effectiveness of teaching and facilitating interaction between educators and learners (Sefriani et al., 2021; Silva et al., 2021). Educators have the option to adopt mobile learning as an alternative to support the learning process (Aripin, 2018).

By utilizing mobile learning, learners have the flexibility to study anytime and anywhere without always requiring direct guidance from educators (Criollo-C et al., 2021; Inayati, 2020; Nehe et al., 2023; Rahardjo et al., 2019; Sisouvong & Pasanchay, 2024). Mobile learning is a learning tool that utilizes technology in the form of smartphones (Lutfianto et al., 2021; Purnama et al., 2024). The use of technology in learning through smartphones with the Android operating system can be employed as a learning medium. The development of mobile learning using smartphones with the Android operating system holds great promise (Pangalo, 2020). Android serves as a smartphone platform based on Linux, representing a new generation that includes middleware and various applications (Hiasa et al., 2023; Nurhaeda et al., 2019).

The teaching approach using Android smartphones is most appropriate in the current digital era. Presently, the popularity of smartphones has penetrated various levels of education, including elementary schools, secondary schools, and higher education. It is undeniable that educators have also embraced this technology, making the utilization of Android smartphones convenient in the context of learning.

The observation results at SMP Negeri 6 Pariaman indicate that the current use of instructional media is still limited to charts, videos from YouTube, and the Canva application. Educators face challenges in displaying videos due to inadequate facilities, while instructional media developed using the Canva application has not been optimized. Although students are allowed to bring smartphones, many have not fully utilized them to search for relevant materials or readings.

Table 1. Average Recap of Students' Daily Ratings for Science Subjects Class VIII SMP N 6 Pariaman

Average recap of students' daily ratings for science subjects class VIII SMP material structure and function of the body in living creatures (sub-material respiratory system)

School name	Number of students	KKTP	PH
SMP N 6 Pariaman	150	75.00	45.00

Based on the table above, the average score obtained by students in the respiratory system material at SMP N 6 Pariaman schools obtained an average assessment in the respiratory system material, namely 45.0. This data shows that the average score in the respiratory system material still has not reached the KKTP (achievement criteria) learning objectives from each school.

To address these challenges, the researcher has designed the development of interactive learning media using Articulate Storyline, which can be integrated into Android smartphones for mobile learning. The application aims to bring innovation to science education, support learning anytime and anywhere, and shift students' smartphone usage towards a more positive direction.

Several previous studies have shown the use of mobile learning-based instructional media. First, Putri et al. (2019) conducted research titled "Development of Sasirangan Science Mobile Learning on Environmental Pollution Material for Junior High School Students." The research type used was Research and Development (R&D) with the 4D development model. The study demonstrated assessment results for media and materials with scores of 4.73 and 4.39, respectively. Practical and peer assessments yielded scores of 4.45 and 4.64. The trial results obtained a score of 4.47. It can be concluded that the developed MLI Sasirangan product is suitable with the criteria of excellent for use in science subjects.

Secondly, a study conducted by Pradana et al. (2020) titled "Development of Interactive Multimedia Learning Based on Android in Natural Science Subjects, Light Material", based on the validation test conducted by media experts, the media validity rate was 97.5%. Meanwhile, material experts assessed a material validity rate of 95%, and the student validity rate was 82.625%. Therefore, it can be concluded that the developed interactive multimedia falls into the valid category. Based on the learning outcomes test of 31 eighth-grade

students, 87% of students scored above the set standard. Hence, the interactive multimedia developed is categorized as effective. Thus, the developed interactive multimedia is both valid and effective for use in learning activities.

The research shows that the use of mobile learning in science education is effective and feasible, as evidenced by improved student learning outcomes. The researcher developed an interactive learning application based on Android as an educational innovation that allows students to learn anytime and anywhere. This application makes learning more enjoyable, stimulates the brain, accelerates understanding, and helps students grasp the material better. In this context, it can be stated that students' learning motivation holds significant importance in achieving the desired learning outcomes (Afiqah et al., 2022; Hidayati, 2019; Idris, 2021).

Given the context presented, the author needs to develop instructional media in the form of an application created with Articulate Storyline. This interactive learning media will be integrated into Android smartphones for mobile learning. Based on the above explanation, the title "Development of Interactive Mobile Learning Media in Science Subjects for Grade VIII Junior High School".

Method

This research utilizes research and development (R&D). Rusidi (2018) research and development are aimed at formulating policies, addressing issues, rationalizing in uncertain situations, exploring, seeking solutions, and designing actions. Meanwhile Sugiyono (2015) states that research validates and develops products as the goal of the development process. This research and development adopts the 4-D development model. The development process encompasses four stages define, design, development, and disseminate based on the model proposed by Thiagarajan (Sugiyono, 2017).

This development model uses a 4D development model. The 4D model has 4 stages, namely Define, Design, Development, Disseminate. The stages or steps in developing the 4D model in this study are shown in Figure 1.

The first stage in the 4D development model is the definition stage, which involves establishing and defining learning requirements. This stage includes several steps such as initial analysis, student analysis, task analysis, concept analysis, and setting learning objectives. Following this, the design stage is carried out to prepare standards for the interactive learning media being developed. At this stage, activities such as media selection, format selection, and initial design are performed. Once the design is complete, the development stage begins with the goal of producing a valid, functional, and efficient product. In this process, Thiagarajan divides development into two phases: validation of the interactive learning media by experts and development testing. The final stage is dissemination, where the developed learning media is introduced to users whether individuals, groups, or systems so that it can be accepted and utilized effectively.

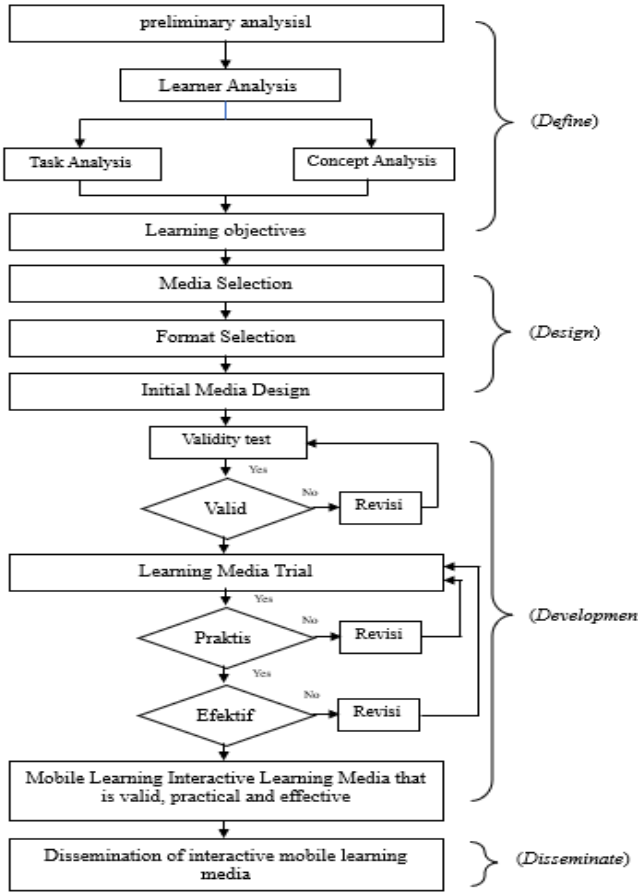

Figure 1. 4D development model

Data collection techniques include several methods. One of these is observation, which is a technique with specific characteristics compared to other methods. Observation is not limited to people but also includes other natural objects. Through observation, researchers can study behavior and the meaning behind that behavior (Sugiyono, 2017). Another method used is interviews. According to Sugiyono (2017) an interview is a meeting between two people to exchange information and ideas through questions and answers, allowing for meaning to be contributed to a particular topic. The third technique is the questionnaire, which is a tool used to collect data to assess the ease of using the media. Questionnaires are given to students to understand their views on the media being used.

The scale used is a Likert scale with alternative responses, namely strongly agree, agree, unsure, disagree, strongly disagree (Riduwan, 2012) with a Likert scale score of 1-5 in the positive category. Then assess its validity categorized on a scale of 0%-100%. The same thing is also carried out at the practicality stage. Analysis of the effectiveness test of Mobile Learning Interactive Learning Media is carried out by providing material comprehension test questions and measuring learning outcomes to see the level of effectiveness of mobile learning interactive learning media products. Student learning outcomes obtained before and after using interactive mobile learning media

Result and Discussion

Analysis

The results of observations at SMP Negeri 6 Pariaman show that the use of learning media is currently limited to charts, YouTube videos, and the Canva application. Educators face challenges in displaying videos due to inadequate facilities, while learning media developed using the Canva application have not been fully optimized. Although students are allowed to bring smartphones, many have not fully utilized them to search for relevant materials or readings. Instead, smartphones are frequently used for scrolling through social media, TikTok, WhatsApp, Instagram, and playing online games. Based on the existing facts, it is known that the average score on daily assessments for the material on the structure and function of living organisms, specifically the respiratory system, was 55.30, while the passing grade (KKTP) is 75.

To address these issues in the science learning process for Grade VIII, it is necessary to innovate in the use of learning media. This is done to motivate students in the learning process. As an effort to optimize science learning, it is essential to use interactive mobile learning media that is appealing to students. This interactive mobile learning media can display text, videos, audio, sound, games, and animations. The use of interactive mobile learning media allows students to learn anywhere and anytime, without being constrained by time, and students can also learn according to their individual learning styles.

Product design

The second stage is the design phase, and the first step is selecting the media. The media selection is carried out to identify interactive learning media that is suitable for the material being presented. In this study, the interactive mobile learning media designed using the Articulate Storyline application was chosen. After the researcher determines the media choice, the next step is to begin the process of creating the interactive learning media. The following is the design of the interactive mobile learning media.

Figure 2. Initial media display

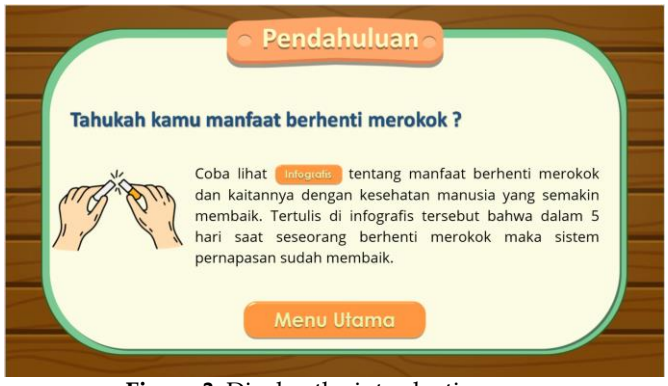

Figure 3. Display the introduction page

Figure 4. Main menu page display

Figure 5. Material menu page display

The next stage is development stage. After the design stage is complete, the next step is the

development stage, which aims to produce a valid, functional and efficient product. Thiagarajan divides the development process of interactive learning media into two main stages. The first stage is the validation of the media, which involves assessment by experts. During this stage, validation is carried out to confirm or evaluate the suitability of the product, involving media experts, material experts, language experts, and certification bodies. This process aims to ensure that the media meets the basic competencies and learning objectives that have been set. Information obtained from validators is used to assess the interactive learning media being developed, including the validity of the media, the material, and the language used. Feedback from validators serves as a guide to improve or modify the product before further testing is conducted. The second stage is development testing where the practicality of the media is evaluated (Purwantoro, 2010). This testing assesses the quality of the media based on the feasibility of applying assessment techniques in general, considering factors such as cost, preparation time, ease of preparation, and ease of assessment. The aim of this trial is to ensure that the media created is not only of high quality but also easy to use.

Validation Test

After the product has been designed, the validation stage is then carried out by 6 experts, namely 2 media experts, 2 material experts, 2 language experts. The following recapitulation results from the validation of mobile learning interactive learning media in class VIII science subjects can be seen in the table 1.

Tabel 2. Recapitulation of Interactive Mobile Learning Media

Validation type	Percentage	Category
Media	92%	Very Valid
Material	89%	Veri Valid
Language	97%	Very Valid

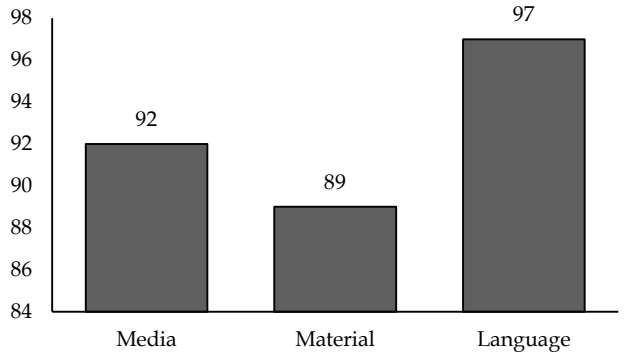

Figure 6. Graph recapitulation of validity result

Based on the results of media validity, material validity and language validity are categorized as very valid. The results of the media, material and language validity test of interactive mobile learning media can be seen in the figure 6.

Practicality Test Results

Interactive learning media that has been validated by media experts, language experts and material experts, then the next stage is the testing stage for mobile learning interactive learning media products. This practicality trial was carried out to determine the practicality of using interactive mobile learning media by teachers and students. Data was obtained from the results of filling out media assessment questionnaires by 2 Teachers and 25 students.

Table 3. Recapitulation of Media Interactive Mobile Learning Result

Respondent	Percentage	Category
Teacher	87.0 %	Very Practical
Student	96.7 %	Very Practical

Based on the table above, it shows that the use of interactive mobile learning media in science subjects is very practical to use in the learning process. The results of the analysis of the practicality of using interactive mobile learning media can be seen in the following graph.

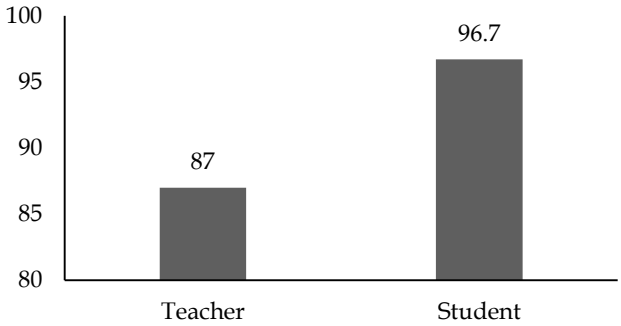

Figure 7. Graph of recapitulation of practical result

Effectiveness Test Results

The effectiveness test of the interactive mobile learning media is shown through the improvement of students' learning outcomes, measured by pretests and posttests. Based on the gain score calculation for class VIII.2, an average score of 0.62 was obtained, categorized as "Medium" (0.3 ≥ N-gain > 0.7). This improvement indicates that the mobile learning media is effective in enhancing students' knowledge in science subjects, particularly the respiratory system material.

Average learning outcomes of students in science subjects after using interactive mobile learning media in class VIII. 2 is 81.4 in the "Very Good" category, so it can be concluded that there has been an increase in students'

understanding of knowledge. This is in line with research conducted by Fathurohman et al. (2023) which shows that using mobile learning can improve student learning outcomes.

The final stage is disseminate stage, this stage is conducted to facilitate the dissemination of the developed product to a wider audience. During this phase, researchers provide the interactive learning media .apk file, which is a mobile learning application, by sharing links through Google Drive. This enables students to download the application and access the interactive learning materials.

Conclusion

The results of this study show that the interactive mobile learning media developed for science subjects in grade VIII of junior high school is highly effective. Based on validation from media, content, and language experts, the media is deemed highly suitable to support the learning process. The results of the practicality test conducted by students and teachers indicate that the learning media is very practical, and the effectiveness test shows that it is effective in improving students' learning outcomes.

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Author Contributions

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Conflicts of Interest

The authors declare no conflict of interest.

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