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DEVELOPMENT OF MATHEMATICS LEARNING MEDIA ON ALGEBRAIC FORMS USING A SIMPLE APPLICATION WITH MIT APP INVENTOR

PENGEMBANGAN MEDIA PEMBELAJARAN MATEMATIKA BENTUK ALJABAR MENGGUNAKAN APLIKASI SEDERHANA MIT APP INVENTOR

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ABSTRACT
This research focuses on the development of interactive learning media for algebraic mathematical materials using a simple application MIT App Inventor. The concept of algebraic forms is often challenging for students due to its abstract nature, so innovative and engaging media are needed to facilitate understanding. The purpose of developing this media is to provide a tool that can increase student learning motivation and understanding of the basic elements of algebra. The application developed with MIT App Inventor is equipped with interactive features such as concept simulations, practice questions, and instant feedback designed to help students master arithmetic operations, identification of variables, coefficients, and constants in algebraic forms. The development results show that this interactive learning media has high validity and practicality, and has the potential to increase student engagement and learning outcomes in algebraic forms. This media is expected to be an effective alternative learning resource for teachers and students in the mathematics learning process.
Keywords: Interactive Learning Media, Mathematics, Algebraic Forms, MIT App Inventor, Learning Motivation, Learning Outcomes

ABSTRAK
Penelitian ini berfokus pada pengembangan media pembelajaran interaktif untuk materi matematika bentuk aljabar menggunakan aplikasi sederhana MIT App Inventor. Konsep bentuk aljabar seringkali menjadi tantangan bagi siswa karena sifatnya yang abstrak, sehingga diperlukan media yang inovatif dan menarik untuk memfasilitasi pemahaman. Tujuan dari pengembangan media ini adalah untuk menyediakan alat bantu yang dapat meningkatkan motivasi belajar dan pemahaman siswa terhadap elemen-elemen dasar aljabar. Aplikasi yang dikembangkan dengan MIT App Inventor ini dilengkapi dengan fitur-fitur interaktif seperti simulasi konsep, latihan soal, dan umpan balik instan yang dirancang untuk membantu siswa menguasai operasi hitung, identifikasi variabel, koefisien, dan konstanta dalam bentuk aljabar. Hasil pengembangan menunjukkan bahwa media pembelajaran interaktif ini memiliki validitas dan kepraktisan yang tinggi, serta berpotensi meningkatkan keterlibatan dan capaian belajar siswa dalam materi bentuk aljabar. Media ini diharapkan dapat menjadi sumber belajar alternatif yang efektif bagi guru dan siswa dalam proses pembelajaran matematika.
Kata Kunci: Media Pembelajaran Interaktif, Matematika, Bentuk Aljabar, MIT App Inventor, Motivasi Belajar, Hasil Belajar

1. INTRODUCTION

Mathematics is an essential subject that equips students with logical, analytical, and systematic thinking skills. However, students often struggle to grasp certain mathematical concepts, including algebraic forms. The abstract nature of this material is often a major obstacle, leading to low student interest and understanding. Conventional learning approaches, which tend to be teacher-centered and less interactive, often exacerbate this situation, leaving students bored and struggling to relate algebraic concepts to everyday life.

Today's rapid technological developments require the education sector to innovate in learning methods, one of which is the use of digital technology-based media. Mathematics learning, particularly algebraic forms, is often considered difficult and uninteresting by most students. This obstacle presents a challenge for educators in delivering the material effectively and engagingly. One innovative solution that can be implemented is the development of interactive learning media based on simple applications using MIT App Inventor.

MIT App Inventor is an easy-to-use Android-based application development platform that doesn't require advanced programming skills. With MIT App Inventor, teachers can create interactive learning materials that are easily accessible anytime and anywhere, and can display animations or visual illustrations of mathematical concepts. Previous research has shown that technology-based learning materials like this can improve student motivation, engagement, and learning outcomes in various mathematics topics, including algebraic forms.

The development of algebraic learning media with this simple application is expected to not only clarify abstract concepts into more concrete ones through visualization but also foster student learning interest. Furthermore, the application of a media development model such as ADDIE (Analysis, Design, Development, Implementation, Evaluation) can ensure that the resulting media is valid, practical, and effective for use in the classroom and independently by students. Thus, developing learning media for algebraic mathematics using the simple MIT App Inventor application is a strategic step to support the optimization of technology-based learning in the digital age. This media is expected to help students understand the concept of algebraic forms in a deeper and more enjoyable way, thereby optimally achieving learning objectives.

2. METHODS

2.1. Research methods

This study uses a Research and Development (R&D) approach. The R&D model was chosen because it aims to produce a valid, practical, and effective interactive learning media product, as well as to test its feasibility. The development model adopted in this study is the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). The main objective is to produce valid, practical, and effective application-based learning media for algebraic forms.

1. Research Stages
   a. Analysis

      Identifying the needs of students and teachers through interviews, questionnaires, and document studies on algebraic forms of material, analyzing the suitability of the material to the curriculum and finding problems in learning algebraic forms of mathematics, determining student characteristics, available learning resources, and analyzing ICT facilities and infrastructure that support the use of MIT App Inventor-based applications.

   b. Design

      Designing the learning application to be developed, including display design, navigation flow, and interactive features that make it easier for students to understand the material, Creating story boards, flowcharts, and application interface sketches, Compiling research instruments such as expert validation questionnaires, student response questionnaires, and learning activity observation sheets.

   c. Development

Developing MIT App Inventor-based applications according to the design, Conducting validation by material experts (to assess the suitability of content/material) and media experts (to assess the appearance and technical aspects of the application), Conducting application revisions based on the results of expert validation.

d. Implementation

Conducting a limited trial of the application on students, Assessing student understanding and engagement when using the media, Conducting a broader field trial in relevant classes.

e. Evaluation

Collecting data from the results of filling out validation questionnaires, student responses, and observation sheets, Analyzing validity (content validity, construction, appearance), practicality (ease of use, availability of features), and media effectiveness (improving student learning outcomes), Completing the evaluation with interviews or focus group discussions (FGD) if necessary to obtain more in-depth input.

2.2. Research Subjects

The subjects of this study were students of grade VII (or classes relevant to algebraic form material) at a junior high school.

2.3. Research Instruments

- Student response questionnaire to determine the practicality of the application.
- Observation sheet of student activities during media use.
- Learning outcome tests to measure the effectiveness of media in improving understanding of the material.

2.4. Data Collection and Analysis Techniques

Data collection was conducted through questionnaires, observations, learning outcome tests, and documentation. Data analysis was conducted using descriptive quantitative (average scores and assessment categories) and qualitative (descriptions of findings, suggestions, and improvements).

3. RESULTS AND DISCUSSION

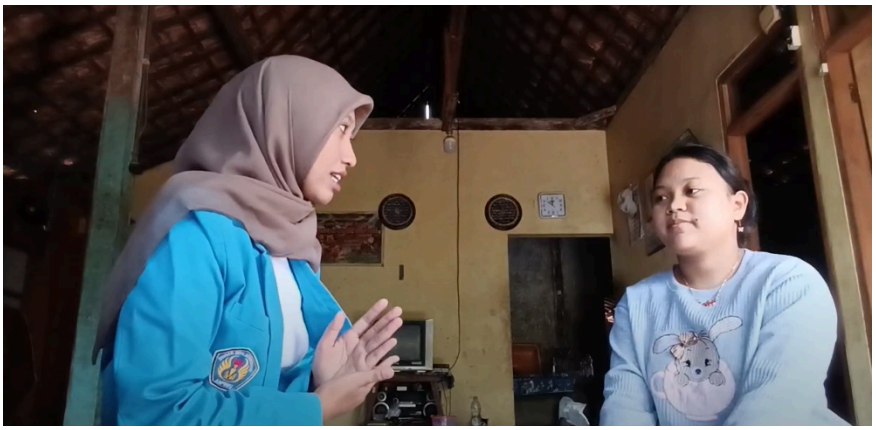
3.1. Results

Developing technology-based learning media is an innovative solution to improve understanding and interest in mathematics, particularly in algebraic forms, which are abstract and often difficult for students to grasp. Android-based learning media developed using MIT App Inventor offers the ease of creating interactive applications without requiring in-depth programming skills and can be accessed anytime and anywhere by students.

In development research using the ADD (Analysis, Design, Development) model as a modification of the ADDIE model, the main stages carried out include analyzing student and material needs, designing applications, and developing learning media that are ready to use.

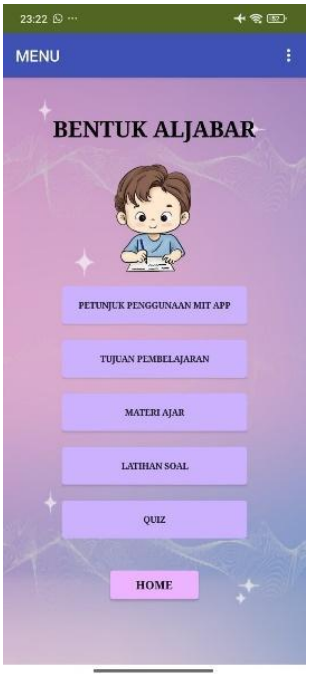
The analysis stage was conducted through a literature study and analysis of the learning needs of algebraic forms according to the 7th grade junior high school mathematics curriculum. This analysis identified students' difficulties in understanding algebraic concepts as well as the need for

interactive learning media that can visualize the material so that abstract concepts become more concrete.

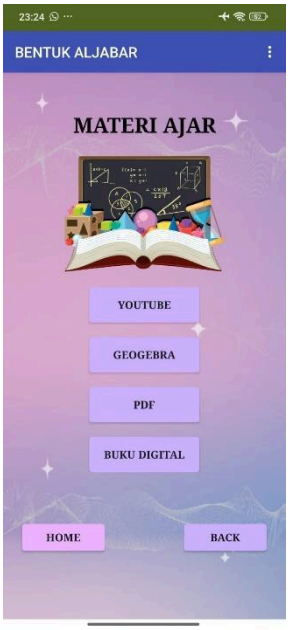


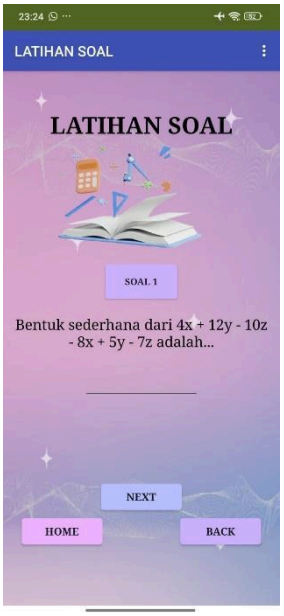
Here is the YouTube link that I attached when testing the MIT Inventor application:https://youtu.be/sJGD-iMwM0U?si=0R7ZjbAMX4bmM9te

In the Design phase, the application was designed with a focus on a user-friendly interface and easy navigation. The design included creating storyboards and flowcharts, as well as selecting interactive features such as teaching materials, practice questions, quizzes, and illustrations of algebraic concepts. Visual media was designed using Canva to be engaging and support understanding of the material.



The Development phase involves building the actual app using MIT App Inventor, a block-based platform that supports fast and easy Android app development. The resulting media is a math learning app containing algebraic material, along with conceptual explanations and interactive practice exercises.





This learning media is designed for independent use by students or as a learning aid in the classroom. Its advantages include ease of access, interactivity, and conceptual visualization, which can enhance student motivation and understanding of algebraic forms. It was also designed to complement the 7th grade mathematics textbook published by the Ministry of Education and Culture in 2022, ensuring its alignment with the current curriculum.

This algebraic learning media based on MIT App Inventor can be used as an alternative mathematics learning strategy that can improve student motivation and learning outcomes. Supported by interactive concept visualization, this media transforms abstract material into something more concrete and understandable. This is a crucial step in leveraging digital technology as an effective learning tool in the modern era.

3.2. DISCUSSION

The development of learning media for mathematics in algebraic forms using a simple application, MIT App Inventor, highlights various aspects that support the success of this media as an effective and practical learning tool. First, the development of this media is based on the real needs of students who have difficulty understanding the concept of algebraic forms, which are classified as abstract material in mathematics. By using MIT App Inventor, developers can create interactive and easily accessible Android-based learning applications, utilizing a platform that does not require advanced programming skills so that even teachers or novice developers can develop media that suits learning needs.

In terms of design, this media is designed with a user-friendly interface, equipped with teaching materials from various sources such as YouTube, GeoGebra, PDF, digital books, interactive practice questions and quizzes that can strengthen the understanding of algebra concepts. The link between the material, media, and curriculum is also an important concern so that this media complements the textbooks used and can be integrated into the formal learning process or as a

student's independent learning media. It shows that in terms of content and appearance, the application is suitable for use, with a high validity value indicating maintained media quality.

The media trial conducted on students helped uncover aspects of practicality and effectiveness. Observation results and student response questionnaires indicated that this media significantly increased learning interest and facilitated student understanding of algebraic concepts. Significant improvements from pretest to posttest results also demonstrated that the use of this media can significantly improve learning outcomes. Its interactivity and easy access through devices widely owned by students, such as smartphones, make this media relevant to the learning styles and needs of today's digital generation.

One of the most significant findings of this study is the potential effectiveness of the media in improving student motivation and learning outcomes. The increase in learning motivation, as indicated by student questionnaire responses, can be explained by the interactive and visual characteristics of the application. Technology-based media tends to be more engaging for today's digital generation than textbooks or lectures alone, and when students feel motivated, they tend to be more actively engaged in the learning process, which in turn can contribute to improved understanding. The significant improvement in student learning outcomes, as evidenced by a comparison of pre-test and post-test scores, indicates that this media is not only engaging but also pedagogically effective. Features such as algebraic simulations and instant feedback on practice problems allow students to learn independently, identify errors, and improve their understanding immediately. Observations during the learning process also support these findings, with students demonstrating more active interaction and a deeper understanding of the concept of algebraic forms. This aligns with cognitive theory, which states that learning involving active interaction and feedback can strengthen neural connections and information retention.

Overall, the development of interactive algebraic learning media using MIT App Inventor provides a significant contribution to innovation in mathematics learning. This media offers a concrete solution to overcome students' difficulties in understanding algebra, while leveraging the potential of digital technology to create a more dynamic and personalized learning environment. This product can be a valuable alternative for teachers in presenting algebra material, as well as for students as an effective independent learning tool. The success of this development also demonstrates that MIT App Inventor is a powerful tool for educators to create custom learning media without requiring a complex programming background.

4. CONCLUSIONS, SUGGESTIONS, ACKNOWLEDGEMENT

4.1. Conclusion

The development of Algebraic Forms Mathematics Learning Media using the simple MIT App Inventor application is that this learning media was successfully developed by meeting the criteria of validity, practicality, and effectiveness. This shows that this application is worthy of use as a learning media with a high validity score. Tests on students show that this media is very practical and helps increase interest and understanding of the concept of algebraic forms significantly, evidenced by the increase in student learning outcomes from pretest to posttest. This media also provides easy access and interactivity according to the learning characteristics of today's digital generation. However, there are limitations related to advanced interactive features and the limited scope of trials so that more extensive testing and feature development are needed for application optimization in the future.

4.2. Suggestion

The development of this learning media should be continued with more comprehensive trials on a larger student population to obtain stronger validation and effectiveness data. Furthermore, developers are advised to add advanced interactive features such as real-time feedback, a varied question database, and improvements to the application's technical aspects to make the learning media more engaging and support deeper learning. Integration of this media into

formal learning activities and training for teachers to optimally utilize the application is also highly recommended. With these steps, the MIT App Inventor-based learning media for algebraic forms can become a more comprehensive and impactful mathematics learning tool in education.

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