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Research Article

Development of Android-based Chemistry Learning Modules on Macromolecule Materials

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Abstract
The rapid development of technology that has penetrated the world of education requires educators to adapt to follow it. Adaptation can be done by creating technology-based teaching materials. One application that can be used to develop android-based modules is mit app inventor. In chemistry learning, android-based learning modules are very helpful in understanding abstract material. The purpose of this study was to determine the process of developing an android-based chemistry learning module on macromolecule material developed using mit app inventor in the preliminary stage. The research method used is R&D with the Plomp model. The data collected were obtained from observations and interviews. The results of the study showed that android-based chemistry learning modules on macromolecule material are very much needed by students to make it easier to understand chemical material.

Keywords: Android, Chemistry, Mit App Inventor, Module

1. Introduction

Macromolecules are the subject matter of chemistry studied from high school to college. Macromolecular material consists of structure, name, properties, which include carbohydrates, proteins, lipids/fats and polymers. This macromolecule has many concepts that link several theories so that it becomes abstract. Students often have problems learning the concept of macromolecules (Viani & Kamaludin, 2020). If students misunderstand the concept of chemistry, it will have an impact on how to solve problems, make decisions, attitudes, and learning (Kusumah et al., 2019). Because of this, innovation is needed in learning chemistry such as the use of teaching materials, such as technology-based modules. Technology-based modules can be used as teaching materials to help students learn independently. This is the advantage of modules that have instructions for self-study (Ramadani et al., 2020).

MIT App Inventor is an application that can be used as a solution for developing smartphone or android-based teaching materials. In its use, the Mit App Inventor application runs on an android system that uses a network. According to Andriani (2021), the MIT App Inventor application is an application that can operate on a smartphone. With the MIT App Inventor application, teachers can make an interesting innovation in learning to increase students' desire to learn and minimise student confusion. In MIT App Inventor leads us to design a sequence of programming code using graphical visual interaction (Axel et al., 2017). This application is designed to provide ease of designing and applying it to the android system with maximum functionality (Kang et al., 2015). Using the MIT App Inventor application makes us feel like we are putting together a puzzle (Syaputrizal & Jannah, 2019).

Relevant research on mit App inventor for learning modules and media has been done previously by Fitri et al., (2021) on mathematics material with the results of media expert validation 97.14% and material expert validation 98.8% with a very valid category. In addition, other relevant research was conducted by Parlika et al., (2019) the results obtained are media that have several questions in the form of interesting educational games. Based on this, researchers are also interested in developing a chemistry learning module on android-based macromolecular material using the mit app inventor application.

2. Methods

The method used in this research is Research and Development (R & D) with the Plomp model. (Plomp, 2013).

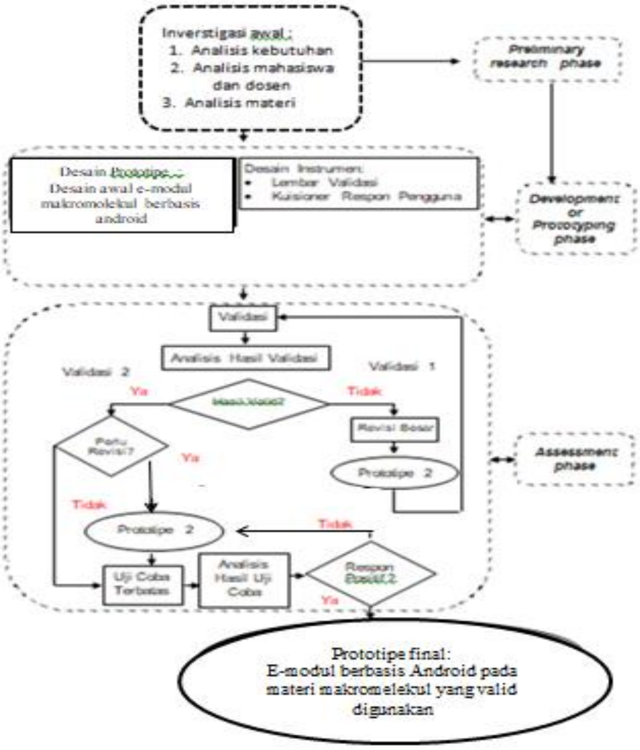

Figure 1. Development flow modification of Plomp's development model

The stages in this study are only at the preliminary stage, namely needs analysis, user analysis, namely students and lecturers, and material analysis. Preliminary analysis aims as an initial step to determine the needs in the product development process in the next stage (Mustika et al., 2023). This study used the subjects of chemical education lecturers at Kuantan Singingi Islamic University and 10 Chemistry Education students who attended macromolecular lectures. The research instruments used were material analysis sheets, lecturer and student interview sheets. The data found were analysed through descriptive qualitative to determine problems and needs.

3. Results and Discussion

The preliminary stage begins with problem analysis, material analysis, learners / students with analysis results are:

A. Problem analysis

Based on interviews conducted with lecturers and chemistry students at Kuantan Singingi Islamic University, several problems were found, including the unutilised use of android as a learning resource. This has an impact on the low motivation of students in participating in learning. Students always use android almost every time but have not been utilised as learning media by educators. The ability of education in creating android-based learning media is also still limited. Based on this, students are less given independent assignments both in the form of projects and nitrates. Giving projects trains students to be active and creative in expressing ideas and designing an imagination to produce new products (Baharuddin et al., 2017).

B. Material analysis

Macromolecular material is theoretical chemistry material so that many students consider the material easy. However, in essence, macromolecular material requires in-depth analysis to understand it because macromolecular material is a combination of submicroscopic, symbolic and macroscopic. To make it easier for students to understand, it is necessary to create materials whose presentation is interesting so that students are motivated to take part in learning. Material analysis is something that must be done when developing teaching materials, because it aims to determine the compatibility of the material and the learning objectives of the product to be produced (Marwanti et al., 2022).

C. Student analysis

Student analysis was conducted to identify student characteristics that underlie the design and development of macromolecular materials. From the results of the analysis of the characteristics of students can operate android properly and correctly. The average student who became the research sample was 18-22 years old, the age range of students is able to think in formal operations or can think abstractly and be able to analyse problems. In addition, students are also required to be able to apply abstract chemical material, especially in chemical reactions (Isnaini & Ningrum, 2018).

The solution to some of these problems is to use the inventor app. Setyowati (2017) said that android-based learning media can open opportunities for teachers to create better and more enjoyable learning. This is because MIT App Inventor is different from the development of learning media in other applications, where the graphic visuals in this application make it easy for users to design it (Axel et al., 2017). MIT App Inventor also has the advantage of reducing user boredom because there is no need to remember and write instructions. The design of the Android-based learning module on macromolecular material is also considered consistent and does not use too many variations of writing and colours, this will make students not bored in using the product.

4. Conclusion

The results of the research, as discussed earlier, indicate that the android-based learning module on macromolecular material, developed using MIT App Inventor, requires further refinement and development. This product is designed not only to motivate students in their learning process but also to enhance their understanding of macromolecules, a complex subject in science. Through the use of interactive features and engaging content, the learning module aims to create an enjoyable and effective learning experience. It is anticipated that this technology will not only boost students' motivation to study but will also positively impact their academic performance and the development of their critical thinking skills. By providing an alternative to traditional learning methods, this learning module seeks to make the concept of macromolecules more accessible and easier to grasp, especially for students who may struggle with conventional textbook learning.

Several improvements can be made to optimize its effectiveness. First, incorporating feedback from students and educators would provide valuable insights into the module's strengths and areas for improvement. This feedback could help refine the interface, content delivery, and interactivity features to better meet the needs of the students. Additionally, it is essential to consider the diverse learning styles of students, ensuring that the module caters to auditory, visual, and kinesthetic learners. To further enhance student engagement and understanding, integrating more multimedia elements such as videos, animations, and quizzes can be considered. Finally, continuous evaluation and updating of the content to reflect the latest scientific developments and educational trends will ensure that the module remains relevant and effective in achieving its educational goals.

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