Development of Android-Based Interactive Multimedia on Colloidal Chemical Systems

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Abstract: This study aims to produce android-based interactive multimedia on colloidal system chemistry material in high school that is suitable for use, as well as to find out student responses regarding the development of android-based interactive multimedia on colloid system material in high school. The method used in this study is research and development (Research and Development) 4D model (Define, Design, Develop and Disseminate). In this case, researchers only carry out research from up to stage three (Develop). The subjects used were 20 students who were taken randomly. The research instruments used included validation sheets, feasibility questionnaires, and student response questionnaires. The validation results by experts show that the developed interactive multimedia is feasible to use with an average validation score of material experts reaching 84.57%, media experts 90.83%, eligibility by educators 90.37% and student responses of 89.53% . The results obtained from the validators, educators, and students indicate that this interactive multimedia is feasible for use in colloidal chemistry learning.

Keywords: 4D; Android; Interactive Multimedia; Colloid System

Introduction

Education is a conscious and planned effort to create a learning atmosphere and learning process so that students can actively develop their potential (UU No. 20 of 2003 concerning National Education System). The educational process can be carried out through learning activities. Learning is an activity that has a goal, namely to teach students to achieve the desired increase in competence (Surayya, et al., 2014; Setiawaty, et al., 2018).

Improving the quality of education in Indonesia can be developed through the implementation of educational reforms. Changes that occur in traditional learning towards learning that further enhances critical thinking is called educational reform (Redhana, 2010). In the world of education, many branches of knowledge must be studied to achieve educational goals. Learning is a teaching and learning process in education and is also said to be a complex process involving several interrelated aspects including psychological, pedagogical and didactic. On the psychological aspect of learning activities students have different levels of development and various learning processes. As in learning to memorize, how to understand concepts, attitudes and motor skills. Because of this, a teacher does not only have theoretical abilities but also must have practical skills so that he can design learning to be better and more interesting, easy for students to understand and fun, (Mahasneh & Alwan, 2018; Malele & Ramaboka, 2020).

Chemistry is a science that studies matter and its changes and has an important position in society because chemistry is always present in everyday life (Ditama, et al., 2015). One of the chemicals that are widely applied in everyday life is the colloid system. The problem that often arises in schools in teaching this material is the difficulty of educators in conveying microscopic to macroscopic aspects to students. The lack of media used causes students' conceptual

understanding of the material being taught to be difficult to understand.

Learning media plays a fairly important role in the teaching and learning process. Therefore, if the media used is interesting, students will automatically like and understand the learning material more (Ditama, 2015). The development of information and communication technology allows learning media to be packaged in a practical and more attractive manner, both web-based and Android-based so that students can easily access them (Manasikana, 2017; Sugiyarto, et al., 2018; Gu, et al. 2022).

The emergence of Covid-19 (Corona virus disease) in 2019 seems to accelerate the implementation of the use of technology in all aspects of life, including the world of education. WHO has announced that the virus that originated in the city of Wuhan is a global pandemic. School and college closures have occurred in more than dozens of countries due to this pandemic. To break the chain of the spread of Covid-19, the Indonesian government is forced to implement physical distancing for citizens. The physical distancing that is applied causes the learning process to be changed in its method, namely learning from home or learning from home. In this condition innovation is needed to make the learning atmosphere of students more enjoyable while studying at home. The development of technology is one of the opportunities in developing media that suits the needs of students. One of them is the use of Android as a learning medium.

Based on the results of observations made at Peusangan 1 Public High School, it is known that educators are still not used to making technology-based learning media, besides that the use of learning facilities provided by schools is still not optimal. This can be seen from computers and infocus which are rarely used in the learning process. Not only that the use of learning models has indeed been implemented but its use in learning is less than optimal.

In addition, students' interest in learning is still lacking. This can be seen from the lack of enthusiasm of students while participating in learning. Associated with learning media is defined as a communication tool used to convey information. In addition, learning media is something that can be used to stimulate students' thoughts, feelings, attention and abilities or skills so that they can encourage the learning process (Ekayani, 2017; Setiawaty, et al, 2022; Imanda, 2021).

One of the factors that can affect interest in learning is the perception of students. Learners tend to have perceptions or develop their perceptions of a learning material. Students who have a good perception of a material tend to have a high curiosity. Furthermore, Setiadi and Muflika (2012) found that not all schools in

chemistry learning did practicum, schools that did not do practicum were due to a lack of teacher awareness regarding the importance of doing practicum, lack of availability of tools and materials needed for practicum, so students did not have experience. and expected knowledge. It is things like this that cause students' chemistry test scores to be far from the minimum class completeness criteria.

The use of learning media in the learning process at SMA Negeri 1 Peusangan is still very minimal, especially the use of Android as a learning medium has never been done, even though Android software is commonly used by educators and students. Furthermore, Aini (2019); Sugyarto, et al. (2018) and Setiawaty, et al. (2018) in his research also said that the existing technology is still not widely mastered by educators so that its use in learning is still very minimal. Learning is still conventional characterized by educators who are the only source of learning and learning media that are not based on information technology.

Method

This research was conducted at Peusangan 1 Public High School on Jalan Medan – Banda Aceh, Peusangan District, Bireuen District, Aceh. The type of research used is Research and Development, adapting the 4-D development model. The stages in the 4-D development procedure (Thiagarajan, et al., 1974) are as follows:

1)	Define: (a) Front and analysis, (b) learner analysis, (c) task analysis, (d) concept analysis, and (e) specifying instructional objectives.
2)	Design: (a) constructing criterion–referenced test, (b) media selection, (c) format selection, and (d) initial design
3)	Develop: (a) expert appraisal, dan (b) developmental testing.
4)	Disseminate: (a) validation testing, (b) packaging, and (c) diffusion and adoption.

The approach used in this study is a qualitative and quantitative approach with the subject being 20 class XI students at SMA Negeri 1 Peusangan taken randomly, 3

(three) chemistry teachers, 2 (two) media experts and 2 (two) material expert. The object of this research is Android-based multimedia.

The instruments used in this study were validation sheets, media feasibility questionnaire sheets and student response questionnaire sheets. Validation sheet data and questionnaire sheets are calculated using a Likert scale. The data obtained from the results of the validation and eligibility as well as the response questionnaire of each student is determined by the percentage using the formula 1:

$$Percentage = \frac{\text{Gain Score}}{\text{Ideal Score}} \times 100\% \qquad (1)$$

Result and Discussion

The initial analysis in this study was to find and determine the problems encountered in the learning process at SMA Negeri 1 Peusangan. At this stage the researcher made observations at the school to obtain the required information. At this stage the researcher arranges the design of the material that will be displayed in the learning media. Data collection is done as a source of media creation. The data collected are journals, chemistry books and the internet which contains colloidal system material. The development stage consists of evaluating material expert validators, media experts, product revisions, educator responses and student responses, Imanda, et al (2017); Ozdilex & Ozkan (2009); Chen, et al (2011); Wang, et al. (2022); Kijima, et al. (2021) and Sumiati, et al (2018).

The next stage is design validation carried out by media expert validators and material experts by filling out validation sheets. data from the results of the assessment is useful to determine the quality of the media being developed.

As for the results of the assessment of the material expert validator I with the percentage of content standards (83.33%) and learning (95%) and material experts II with the percentage of standard content (80%) and learning (80%) in the very good category.
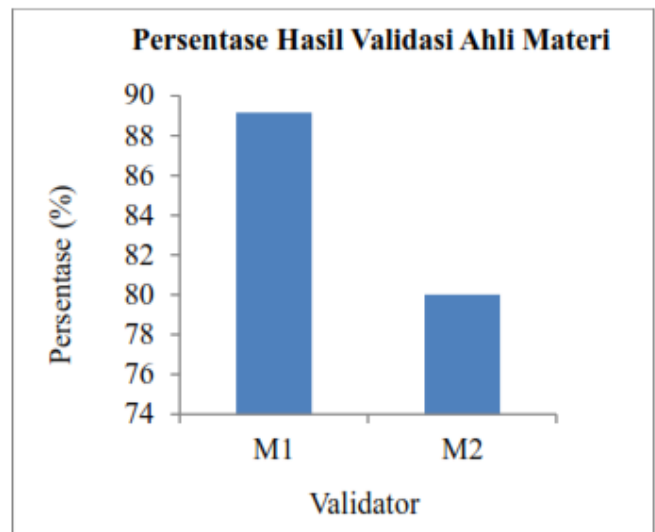

Figure 1. Graph of the Percentage of Material Expert Validation Results

While the results of the assessment of the media expert validator I on the linguistic aspect (90%), software engineering (92.5%), and visual and audio display (92%), as well as the score results of the media expert II validation test questionnaire on the linguistic aspect (90 %), software engineering (92.5) and visual and audio display (88%). obtained an overall percentage of 93.4% with a very good category.
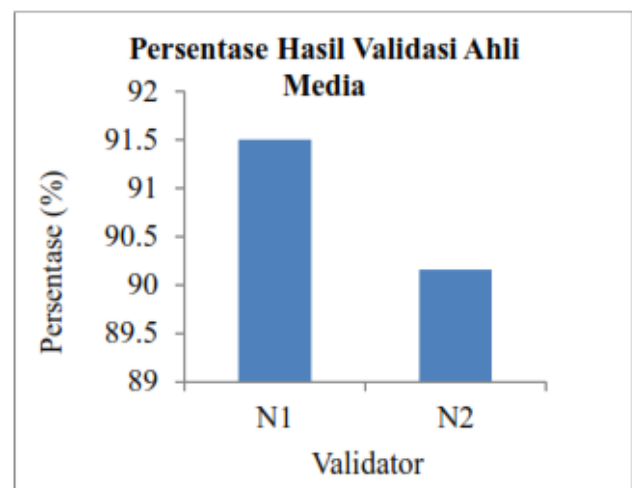

Figure 2. Graph of Percentage of Media Expert Validation Results

The next stage is product revision according to suggestions and input from the two validators. After the product revision stage, it was continued with the product trial stage which was carried out by 3 chemistry educators at Peusangann school. Media feasibility with acquisition Based on the results obtained this media is stated to be in the "very feasible" category.
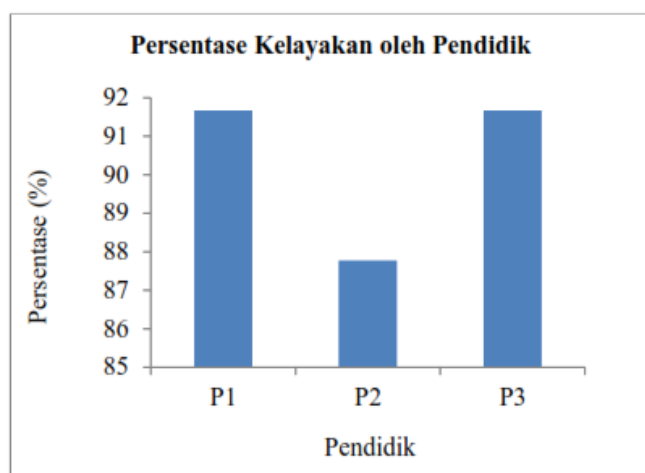
Figure 3. Graph of Percentage of Media Eligibility by Educators

Then a product trial was carried out on 20 students to find out the students' response to the media being developed. The results of student responses obtained an overall percentage of 89.53% in the very good category. After testing the product, the product revision stage is carried out in accordance with suggestions and input from educators and students.

Conclusion

Based on the overall results of the research and development that has been carried out, it can be concluded that the development of Android-based interactive multimedia on colloidal system chemistry shows very valid criteria. Furthermore, the developed media also shows that it is very feasible to use in learning based on the feasibility test by educators and student responses.

Conflicts of Interest
The authors declare that there is no conflict of interest regarding the publication of this article.

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