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Physics Learning Media Results Based on *Augmented Reality* On Crystal Structure Material

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ABSTRACT

Technological developments are very rapidly affecting the world of education, one of which is learning media. This research aims to determine respondents' responses in a needs analysis questionnaire regarding the development of Augmented Reality-based physics learning media in the Solid State Physics course on Crystal Structure materials. The population subjects in the research were students who had taught the Solid State Physics course. This research uses a survey method with a qualitative descriptive approach. The results of the respondents' needs analysis questionnaire showed that as many as 84% of students agreed that Augmented Reality media was used as a learning medium at the University. Apart from that, as many as 96% of students agreed with the development of Augmented Reality-based physics learning media on Crystal Structure material. Thus, this needs analysis questionnaire becomes a preliminary study and reference used by researchers in developing Augmented Reality-based physics learning media on Crystal Structure materials.

Keywords: Learning Media, Augmented Reality, Crystal Structure

ABSTRACT

The rapid development of technology has affected the world of education, one of which is in learning media. This study aims to determine the responses of respondents in the needs analysis questionnaire regarding the development of *Augmented Reality- based physics learning media* in the Solid State Physics course on Crystal Structure material. The population subjects in the study were students who had taught the Solid State Physics course. This study used a survey method with a qualitative descriptive approach. The results of the respondent needs analysis questionnaire showed that 84% of students agreed that *Augmented Reality media* was used as a learning medium at the University. In addition, 96% of students agreed to the development of *Augmented Reality -based physics learning media* on Crystal Structure material. Thus, this needs analysis questionnaire is a preliminary study and reference used by researchers in developing *Augmented Reality- based physics learning media* on Crystal Structure material.

Keywords: Learning Media, Augmented Reality, Crystal Structure

INTRODUCTION

The rapid development of science and technology in the 21st century has encouraged renewal efforts in the use of technology in education. The presence of technology in education has a significant meaning in the learning and teaching process. The rapid development of technology today has a significant influence on all aspects of life, including how humans carry out learning activities. In teaching and learning activities, if

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there is any ambiguity in the material presented, it can be helped by presenting technology.

According to Rosenberg in G. Gunawan (2009) in [1] with the development of the use of information and communication technology, there are five shifts in the learning process, namely: 1) from training to performance, 2) from the classroom anywhere and anytime, 3) from paper to *"on line"* or channels, 4) from facilities to network facilities, 5) from cycle time to real time. The complexity of the material to be delivered to students is simplified by technology [2] . According to Wahab " *Technology is conceived as firm-specific information concerning the characteristic and performance properties of the production process and product design"* , according to this study, technology is defined as something that has characteristics and abilities to produce characteristics and abilities to produce and design a product [3] . Information technology in education can be understood as a complex and integrated process involving people, ideas, equipment, and organizations to analyze problems, find ways to solve problems, implement, assess, and manage problem solving that covers all aspects of human learning (Sukadi, 2008) in [4] .

With the increasingly rapid technology, it is expected to produce or develop a new product or improve a previously existing product so that it can be useful in the field of education. The use of media with technology that is done correctly will help learning activities and efforts to obtain information and knowledge to be more effective and efficient [4] . With the media, students can learn independently and can attract students' attention in learning. The many types of media that can be used as learning media, one of which is Augmented Reality-based learning media .

At this time, *Augmented Reality* (AR) is considered to have great potential to maximize technological progress in the fields of education and non-education.

Students and lecturers must start maximizing this potential. *Augmented Reality* provides an illustration to users about the combination of the real world and the virtual world using software. *Augmented Reality* is believed to be able to help in the development process and quality of science learning [5] . *Augmented Reality* can be described as a technology that is able to display 3-dimensional objects, videos, sounds, and so on on *smartphones* . In making this *Augmented Reality* , researchers used *Unity 3D software* . *Unity 3D* is a tool for creating 3D video games or other interactive content such as architectural visualizations or *real-time* 3D animations. *Augmented Reality* allows users to see two-dimensional or three-dimensional virtual objects projected onto the real world [6].

Based on the background of the problem, to help students and lecturers in learning abstract things in the solid state physics course on the Crystal Structure material, the researcher has analyzed the data on the need for *Augmented Reality* in the Solid State Physics course on the Crystal Structure material.

METHODOLOGY

The research method used in this study is the observation method. This method is a process of collecting data through various views from many respondents with the application of several specific factors [7] . The observation research method is a method carried out by studying samples with the aim of finding interconnected events, the existence of observational research so that the results obtained are interconnected. This research started from November 27, 2022 to January 12, 2023.

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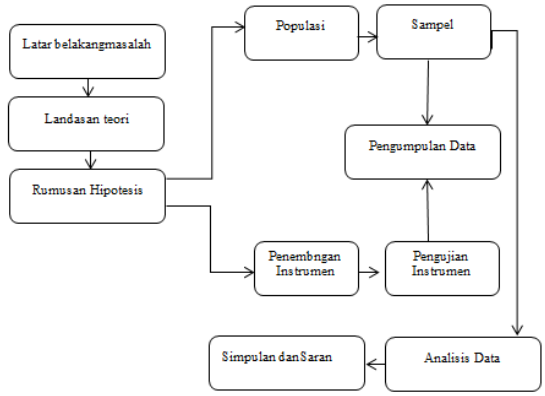

Figure 1 Observation Method

This study uses a qualitative descriptive approach where data analysis is formed into a narrative description that is clarified by tables or diagrams and numeric data as supporting data. Then, the data collection technique used is in the form of distributing questionnaires that are submitted through *the Google Form platform. The distribution of questionnaires aims to obtain information about Augmented Reality* -based Physics learning media on Crystal Structure material.

RESULTS AND DISCUSSION

Based on observations conducted through the distribution of Needs Analysis questionnaires at Muhammadiyah University Prof. Dr. HAMKA and Syi'ah Kuala University, it was obtained that students have not understood the illustration of 7 Simple Crystal Structure Systems, in addition, access to digital media used in learning still uses Power Point Animation, and other non-digital media, namely Physics Practical Tools, Physics Demonstrations, and Objects around. In physics learning, understanding and learning media are important processes that must be carried out to support students in understanding a concept, especially in abstract Physics lessons. This is in line with the results of the Needs Analysis conducted by the study.

3.1 Student Understanding of Crystal Structure Material

Table 3.1. 1 Understanding Crystal Structure

No	Answer Options	Percentage
1	Yes	79%
2	No	21%

Table 3.1.1. Above shows the results of students' understanding of the Crystal Structure material, namely 78.9% of students experienced difficulties through the teaching materials and methods applied by the lecturer. The percentage results in the table are depicted in the diagram below.

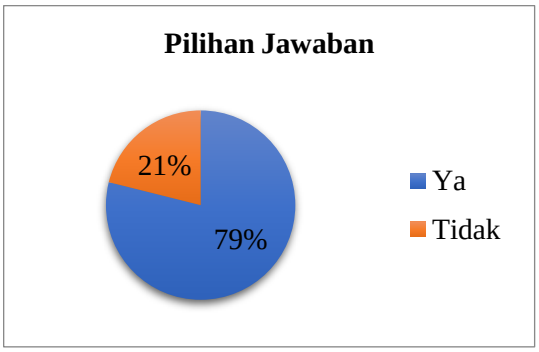

Figure 2. Diagram of Student Understanding of Material and Illustration of Crystal Structure

Figure 2. States that 79% of students do not understand the Crystal Structure material through the teaching materials and methods applied by the lecturer, and 21% understand the material and methods.

3.2 Students' understanding of the learning media provided by the lecturer

Table 3.2. 1 Students' Understanding of Crystal Structure Learning Media

No	Answer Options	Percentage
1	Yes	53%
2	No	47 %

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From Table 3.2.1, it is obtained that 53% of students do not understand the media used in learning Crystal Structure. During the learning process, lecturers use learning media, the media used are digital and non-digital learning media. The digital media used is *Power Point Animation*, while the non-digital media used is Physics Teaching Aids. Then, the results obtained in the table are described again in the diagram below.

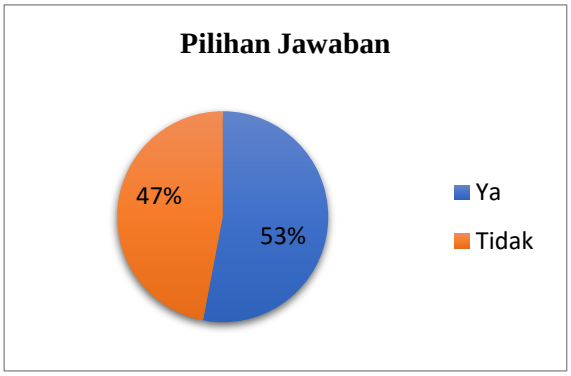

Figure 3. Diagram of Student Understanding of Crystal Structure Learning Media

Figure 3. Shows that as many as 53% of students do not understand the learning media during the teaching and learning process, and as many as 47% of students understand the learning media presented by the lecturer.

3.3 *Augmented Reality* Media at University Level

Table 3.3. 1 The Need for Augmented Reality Media at University Level

No	Answer Options	Percentage
1	Yes	84%
2	No	16 %

Based on Table 3.3.1, it was obtained that 84% of students agreed with *Augmented Reality- based learning media applied at the University level, and students already knew about Augmented Reality-* based learning media . Then, the results obtained in the table are described again in the diagram below.

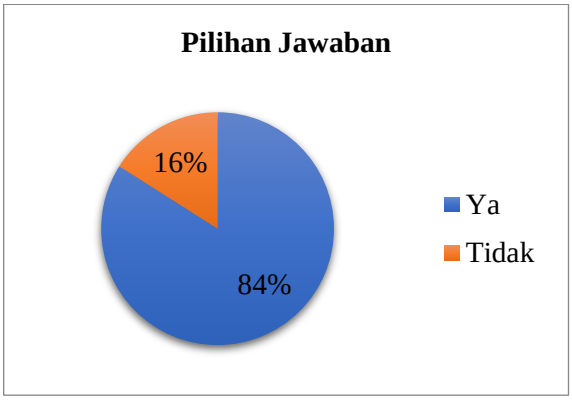

Figure 4. The need for Augmented Reality Media at the University level

Figure 4. Explains that as many as 84% of students agree that *Augmented Reality-based media* is needed at the University level, while 16% stated that *Augmented Reality media is not needed* at the University level.

3.4 The Use of *Augmented Reality* in Crystal Structure Material

Table 3.4. 1 Use of Augmented Reality on Crystal Structure Material

No	Answer Options	Percentage
1	Yes	95%

From table 3.4.1 it is explained that 95% of students agree if the development of teaching materials such as modules based on *Augmented Reality* for learning Crystal Structure. Then, the results obtained in the table are described again in the diagram below.

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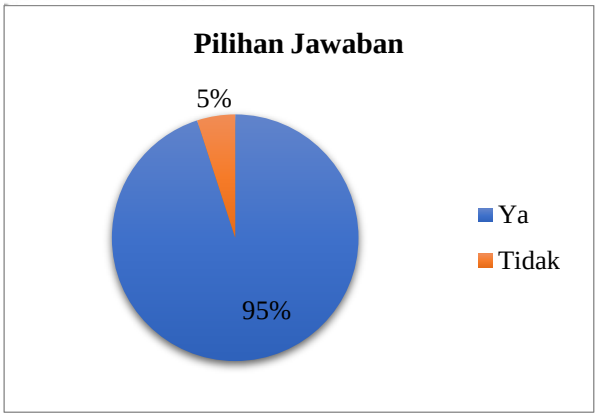

Figure 5. Use of Augmented Reality on Crystal Structure Material

From Figure 5. Explains that 95% of students agree that it is necessary to develop teaching materials such as *Augmented Reality* and 5% are not needed. According to students, the Solid State Physics course will be better understood if using *Augmented Reality-based learning media.*

Based on the results of the Needs Analysis, it is necessary to conduct research on *Augmented Reality- based learning media* so that students can understand the lecturer's explanation regarding the Solid State Physics course, therefore the author conducted this research with the title "Development of *Augmented Reality Learning Media* on Crystal Structure Material".

CONCLUSION

Based on the results of the analysis of the needs of *Augmented Reality -based Physics learning media* on Crystal Structure material using the survey method, in this study the data was taken using a questionnaire, the data results show that there is a need for *Augmented Reality-based media development* at the student level, especially on Crystal Structure material so that students can understand the Crystal Structure material.

THANK-YOU NOTE

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