

ANALYSIS OF THE NEED FOR AUGMENTED REALITY (AR)-BASED CHEMISTRY CARDS IN ELEMENTAL CHEMISTRY MATERIALS

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Abstract

The research aims to analyze students' needs for augmented reality (AR)-based chemistry cards in elemental chemistry materials. This research employs a qualitative descriptive method. The subjects of this research are chemistry a teacher and twelfth-grade science students at one of the public high schools in Ogan Komering Ulu Regency. Data collection techniques include interviews and questionnaires. The research instruments consist of interview guidelines and Google Forms questionnaires. Based on the research results, it can be concluded that there is a need to develop augmented reality-based chemistry cards for elemental chemistry materials.

Keywords: Augmented Reality, Chemistry Card, Elemental Chemistry, Needs Analysis.

1 INTRODUCTION

Chemistry is a branch of natural science that studies the structure, composition, properties, and changes of matter and the energy accompanying these changes. Chemistry lessons should be very enjoyable to study due to their relevance to the development of attitudes and awareness about the advancement of science and technology and their impacts. However, in reality, chemistry is considered one of the most difficult subjects in school [1], [2]. This is because many chemistry concepts are abstract and a lot of material must be understood and mastered, which makes students quickly bored and uninterested in following chemistry lessons [3]. This is consistent with the results of a questionnaire distributed to twelfth-grade science students at a public high school in Ogan Komering Ulu Regency, which found that chemistry is generally considered a difficult subject to understand. A total of 69.4% of students stated that chemistry is a difficult subject to understand.

In the twelfth-grade chemistry curriculum, there is a topic on elemental chemistry. This material is abstract and theoretical, with no calculations involved [4]. Elemental chemistry is one of the materials in chemistry education that has the potential to be boring and challenging for students [5]. Elemental chemistry material has the potential to cause feelings of boredom because the material coverage is broad and rote [6].

One alternative to inspiring and motivating students to learn chemistry is through the use of instructional media and technology. Historically, education in Islam has utilized media since the time of the Prophet Muhammad SAW, who used teaching aids when imparting knowledge to his companions [7].

Using element cards in science education, particularly for teaching chemical elements, is beneficial because it helps students learn about chemical elements more creatively, making the learning process enjoyable. Element card medium is also considered capable of stimulating students' thinking skills to learn actively and creatively, indicating that using element cards is effective and can enhance students' learning outcomes, with cognitive aspect learning outcomes at 96.25%, affective aspect outcomes at 64.29%, and psychomotor aspect outcomes at 78.57% [8]. Other research results state that using learning technology in the form of an element Uno card game is very helpful for students. It enables them to understand and memorize chemical elements, especially the main group elements. The use of learning technology can make students more enthusiastic about learning [9].

Technology in education has undergone many changes over time [10]. The current development of technology has given rise to an innovation called augmented reality, or AR for short. It is a technology that can integrate 3D objects into the real environment using a webcam. Augmented reality has been used in developed countries for education purposes. Research by Malinka Ivanova and Georgi Ivanov indicates that using augmented reality as a learning medium can help students understand concepts and theories, stimulate conceptual thinking, provide a 3D experience, enhance representation and perception, and create an interactive and enjoyable learning atmosphere [11]. Augmented reality is particularly supportive of abstract learning, such as chemistry.

The elemental chemistry material covers topics related to chemical elements or the abundance of chemical elements on Earth. Teachers cannot present these elements physically in the classroom, so they must use educational media technology to engage students' learning interests. One technology that can be utilized is augmented reality. A new learning experience for students is expected to make them more interested in studying elemental chemistry.

The development of augmented reality-based cards as learning media can be further explored. Therefore, the researcher feels the need to conduct a study related to the analysis of the development needs of chemistry card media based on augmented reality for the topic of elemental chemistry in one of the high schools in Ogan Komering Ilir Regency.

2 METHODOLOGY

This study employs a qualitative descriptive method. The subjects of this study are chemistry a teacher and twelfth-grade science students at one of the public high schools in Ogan Komering Ulu Regency. The data collection techniques used are interviews and questionnaires. The research instruments consist of interview guidelines used to interview teachers and students, and Google Form questionnaires given to students to determine their needs for learning media. Google Forms is one of the applications recommended as a tool for questionnaires/surveys [12].

3 RESULTS

Research data were obtained after interviews with a teacher and twelfth-grade science students at one of the public high schools in Ogan Komering Ulu Regency. Additionally, questionnaires were distributed to students. These interviews and questionnaires aimed to identify the initial problems experienced by students and teachers in the chemistry learning process. The interviews and questionnaires found that chemistry learning at one of the public high schools in Ogan Komering Ulu Regency already uses PowerPoint as a learning medium. However, this medium is insufficient to support chemistry learning. As a result, students are less enthusiastic about learning chemistry and find it more difficult to understand chemistry lessons.

The learning process for twelfth-grade science students at one of the public high schools in Ogan Komering Ulu Regency underwent two years of distance learning. One of the problems with changing online learning to offline learning is the lack of motivation to learn [13]. Students are not interested in learning that use unsupportive media. Another impact of distance learning was the lack of cooperation and communication between students and teachers. Students desire learning media that are practical, creative, and supportive in their chemistry learning, providing new experiences, and making learning enjoyable.

Further findings from distributed questionnaires show that 55.6% of students experience difficulties with theoretical chemistry material. The Teacher conveyed that the scores of one of the theoretical materials, such as elemental chemistry, were quite low. This elemental chemistry material is a theoretical material that has the characteristics of a large amount of material and tends not to involve [14]. Elemental chemistry material is considered quite abstract, making it challenging for students to understand. This was also conveyed by other researchers that the concepts and theoretical knowledge presented in this elemental chemistry material are very abstract and generally this elemental chemistry is difficult for students to understand due to the abstract nature of the material [15]. Furthermore, the lack of media usage is due to teachers' limited ability to create innovations in chemistry education. Although the use of technology is easily accessible at a public high school in Ogan Komering Ulu Regency, allowing teachers to use various learning media. This is in line with the research results of another researcher that one of the causes of elemental chemistry material being difficult to understand is the lack of use of learning media in the learning process [16].

Additionally, the result of the interview with the student revealed their desire for learning media that is practical, creative, easy to use, and provides a new and enjoyable learning experience. One such medium is the chemistry card. Chemistry Learning Media using cards plays an important role in learning [17]. The card media is used for learning to create a new desire and interest in learning, create motivation, and stimulate learning activities [18]. In this analysis, it is also seen that in teaching elemental chemistry, it is necessary to use augmented reality so that students can view the chemical elements in real-time through their smartphones. Augmented reality can visualize objects in real life, thereby providing a different experience for students [19]. The results of the distributed questionnaire showed that 100% of the twelfth-grade science students have smartphones that can be used for learning with augmented reality. Augmented reality can be run on smartphone devices, the camera on the smartphone is used to track markers, and once the marker is detected a 3D object or other information will appear [20]. The questionnaire filled out by the twelfth-grade science students showed that 94% agreed that learning should be assisted with technology-based learning media. Therefore, the researchers feel it is necessary to develop augmented reality-based chemistry cards for the element chemistry material, targeted at the twelfth-grade science students at a public high school in Ogan Komering Ulu Regency.

4 CONCLUSIONS

The learning process for elemental chemistry material needs to utilize augmented reality so that students can see chemical elements in real-time through their smartphones. Therefore, the researchers conclude that there is a need to develop augmented reality-based chemistry cards for elemental chemistry material.

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