

Learning Media Development Based Technology of Augmented Reality In Inorganic Chemicals Culture

Rahmawati¹, Khoironni Devi Maulana², Nuni Widiarti S.Pd, M.Si³

¹ Department of Chemistry, Faculty of Mathematics and Natural Sciences, Semarang State University, Semarang Building D6 Lt 2 Sekaran Gunungpati Semarang 50229, Indonesia

² Department of Chemistry, Faculty of Mathematics and Natural Sciences, Semarang State University, Semarang Building D6 Lt 2 Sekaran Gunungpati Semarang 50229, Indonesia

³ Lecturer of Chemistry, Faculty of Mathematics and Natural Sciences, Semarang State University, Semarang Building D6 Lt 2 Sekaran Gunungpati Semarang 50229, Indonesia

Abstract: *An inorganic chemistry course is a course that explores all about the chemical elements that become basic knowledge in the chemistry department. The handbooks that currently exist have not been able to maximize the students in understanding the material because the content of the book is less interesting because it is just all writing. Along with the development of the era, many technologies used in the development of learning media one of them that is augmented reality (AR). Augmented Reality (AR) is a natural way to explore 3D objects and data, AR is a concept of a blend of virtual reality with world reality. The virtual objects of 2 Dimensions (2D) or 3 Dimensions (3D) seem to look real and to unite with the real world. In AR technology, users can see the real world that surrounds its with the addition of virtual objects generated by the computer. The purpose of writing this scientific paper to provide innovative development of learning media based on augmented reality technology in the course of inorganic chemistry in the form of applications in android so that the students more easily understand about inorganic chemistry.*

Keywords: Augmented Reality, Inorganic Chemistry, Learning Media

1. Introduction

At this time increasing attention to the context aspect in chemistry learning is a must. If not, then chemistry learning will not succeed in delivering Indonesian students to gain meaningfulness in learning. Interconnection of context aspects to chemistry learning will increase students' understanding to reach the level of axiology. Learning will be less meaningful if the learner does not understand the benefits to be gained from laboriously studying a particular chemical content ^[1].

Chemistry as one of the subjects of science, as well as mathematics and physics, is not so popular in the eyes of students. Chemistry is considered too difficult to study ^[2]. One of them is an inorganic chemistry course. This course explores the elements of metal and non-metallic elements. Although student has been handbooks to facilitate the study of inorganic chemistry, students still find its difficult. This is due to the unattractive contents of the majority of books, and even all of them are written. Therefore it is necessary to develop a more interactive learning media to attract students so passionate about studying subjects, especially inorganic chemistry. With the development of the times, has many technologies that are utilized to facilitate the learning process and also make the learning process more interactive. One of the more developed interaction technologies is an Augmented reality ^[3].

Augmented Reality (AR) is a natural way to explore 3D objects and data, AR is a concept of a blend of virtual reality with world reality. The virtual objects of 2 Dimensions (2D) or 3 Dimensions (3D) seem to look real and unite with the

real world. In AR technology, users can see the real world that surrounds it with the addition of virtual objects generated by the computer ^[4].

The advantages of AR technology allow the user to interact using his gestures naturally. The camera as the 'eye' of AR technology takes the image of the marker on an ongoing basis, processing and then generating virtual interaction that is visible on real-world display both on-screen and head mounted display (HMD). The combination of virtual world and the real world is expected to bring a process of learning more effective and efficient. Hannes Kaufmann (2002) of the Institute of Software Technology and Interactive Systems of Vienna University of Technology Austria supported it in his paper "Collaborative Augmented reality in Education". In the paper, Hannes reveals: "Due to advances in the development of pedagogical concepts, applications and technologies, and the decline in hardware costs, the small-scale use of augmented reality technology for educational institutions has become very possible in this decade.

2. Writing Method

The approach used in this paper is descriptive qualitative based on literature review. Selection of this approach is expected to provide a careful picture of the situation or specific symptoms in the object of study. In this case, the author tries to make an idea about the concept of an AR-based device for AR technology as the development of instructional media for inorganic chemistry courses.

3. Discussion

Augmented Reality Usage Process

Process modeling uses to describe the expected functionality of a system and can represent a relationship between actors with the system. In this use case, there are two actors that are user and system. Use cases related to the application and use of augmented reality with hardware device objects can be seen in Figure 1.

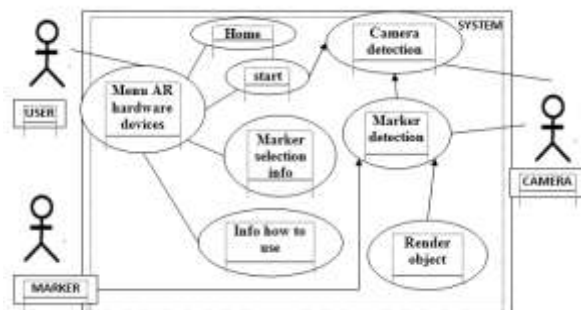


Figure 1: Use case diagram [6]

On Figure 1 it describes each description performed by the actor starting from the process of running the hardware device AR application, the object input process, the marker detection process, and the process of rendering the object or displaying the object.

Data modeling using Class Diagram. Class diagrams describe the state of a system, the relationship between classes within the system, as well as the structure and description of the class. Class diagrams of augmented reality applications can be seen in Figure 2.

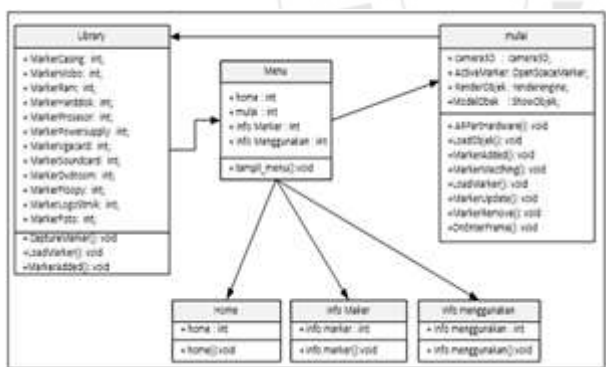


Figure 2: Class Diagram [6]

System and Software Design

At this stage that will be designed namely: Design flowchart making applications

Application Creation Flowchart

Application creation begins with creating a three-dimensional object using Autodesk 3D max, then export the object in the format (.Scene), then import it into OpenSpace3D. The next stage of making markers and set the size and type. Menu views and buttons are created using saved Adobe Flash CS3, and the formatted menu (menu) and menu buttons (.Swf) are imported into OpenSpace3D. The application creation flowchart is shown in Figure 3.

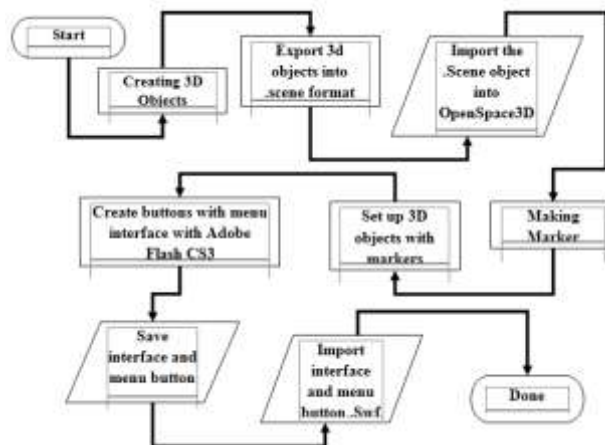


Figure 3: Flowchart Making Applications [6]

Experimental test of Augmented Reality (AR) technology based learning device

Limited trials of instructional devices will be conducted in Higher Education. Test this product to know the advantages of software in an English application. The trial of this product also to know suggestion and repair of android application in accordance with student input. The data collected from the test results of the questionnaire products were analyzed descriptively by the criteria technique. Questionnaire indicator of interest, material, and language. The interest indicator relates to the appearance and interest the student on the android application. The material indicator relates to inorganic chemicals that are integrated into the application, while the language indicator is related to the language and to the symbol used.

Trial of AR technology based learning device

Trial usage of learning device will be done in college. Testing this usage to know the usefulness (exposure) of learning devices based on augmented reality technology in the form of Android application on one of chemistry subjects that are inorganic chemistry. Usefulness and practicality for students with questionnaire majors to students and lecturers after being associated with learning with android technology augmented reality.

Questionnaire indicator indicators:

- Interest in learning of inorganic chemistry materials based on AR technology using the device that has been made.
- adjustment in understanding the concepts of augmented reality chemicals
- Student curiosity is high.
- students' ability to connect concepts with what they have in their daily lives.
- Clarity of examples of concepts related to everyday life.

Questionnaire lecturer's questionnaire contains:

- The ease and practicality of the device (android apps) are made.
- Convenience and interest by using augmented reality-based technology tools and models
- Clarity of concept with examples in everyday life.

d) Modification in understanding the concepts of augmented reality chemicals.

The end product of android application based on AR technology in learning of inorganic chemistry

This product is an android app that can be disseminated, used and applied in inorganic chemistry learning in college. Technically based software. Quality booster technique. Inorganic chemistry in college.

4. Conclusion

Augmented Reality is expected to be one solution to facilitate students in understanding the material, especially in inorganic chemistry courses.

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Author Profile



Rahmawati was born in Wonogiri, 24 June 1997. This 20-year-old woman is studying at one of the public universities in Semarang, Semarang State University since 2015. She took chemistry education field. He began to love writing scientific papers since meeting with Emas Agus Prastyo Wibowo, a student of public university Semarang in 2016 and the best innovator student of national achievement in 2016.