



Augmented reality as science medium to improving visual literacy of junior high school students on animal cell and plant cell

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Abstract Increasingly technological developments in the increasing world require teachers to think creatively and wisely in using technology into the learning process therefore to increase the human resources of science and technology. To integrated technology in education by learning medium that can enhance students' visual literacy. Visual literacy in the science learning process not only increases students' science literacy but also increases student creativity. This review article in this article will be carried out the identification of Augmented reality as a medium of science learning on cell material in improving visual literacy based learning. Utilization Augmented reality as learning medium is cell as the objects that can be displayed are parts of animal cells and plant cells and their functions can be seen from all sides and their size can be zoomed (zoom in or zoom out). It can be concluded that the use of Augmented Reality-based media can help students in the process of learning animal cell and plant cell materials so as to improve visual literacy in students.

Keywords visual literacy, technology, augmented reality, integrated science

1. Introduction

The rapid development of science and technology also demands an increase in human resources because of that the government seeks to improve the quality of education at both primary, secondary and college levels. Increasingly technological developments in the increasing world require teachers to think creatively and wisely in using technology into the learning process therefore to increase the human resources of science and technology. The use of technology in the learning process in line with the demands of the 2013 Curriculum, the learning process must be able to integrate information, communication, and technology (ICT), but most Indonesian teachers only use ICT to send student assignments, look for references, and display media power point in learning activities [1]. Actually, utilisation of technology in education is very potential in improving students' motivation in learning, increasing students' independence in learning, and improving student learning outcomes [2-3].

In the field of education, technology can be integrated into teaching materials both as an online learning module and as a medium in the learning process that can improve student motivation in learning, especially in the abstract concept of Natural Science course. An abstract subject that can not be seen by eye directly, one of them is the subject about the cell. Although the cell is present in all living things known to the student but study of the cell can not be done directly because of its microscopic size the learning of the part of the cell is usually through microscopic observation. But in reality, there are still many schools in Indonesia that do not have laboratory facilities including no microscope. Therefore, to overcome the learning process on the concept of biology that is abstract is usually used visual learning media to improve visual literacy skills of students [4]. The importance of visual literacy in the science learning process not only increases students' science literacy but also increases student creativity [5].



One of a visual medium that can be used in any school and it based on technology is an Augmented reality. The augmented reality system describes the real world with the virtual world by analysing real-time objects captured through cameras [6]. Augmented reality development as a Natural Science learning media needs to be done so it will simplify students in learning an abstract concept in Natural Science. It is also supported by the rapidly growing Android technology. Therefore, in this article will be carried out the identification of Augmented reality as a medium of science learning on cell material in improving visual literacy based learning.

Method

Literature and data sources

The author of this paper uses library research (literature). Research library is a writing method using an object of research library is a writing method using an object of research studies that focus on literatures.

Data processing

Data processing is done by combining some of the information to be used as an argument and perspective problems. Because of that, it can be said of data and information processing techniques performed by the argumentative descriptive, with writing that is descriptive, describe.

Discussion

Science learning is concerned with the process of finding out rather than collecting concepts, facts or principles. Natural Science is a systematic knowledge that is expected to develop student learners, especially in the application of knowledge to the phenomenon experienced, the learning process emphasises the provision of direct experience to students in order to develop competence in exploring and understanding the nature around scientifically [8].

Cell material is one of the sub-subjects that discussed in Science Class VII grade semester 1 in Indonesia' curriculum. Cells are the smallest structural unit of living things that can be distinguished based on the presence or absence of nuclear membranes it is called prokaryotic cells are types of cells that have no nuclear membrane and are only held by groups of Monera, Blue Algae, and Bacteria. The second type of eukaryotic cell is a cell that has a membrane at its nucleus and it present in all living species except in Bacteria, Blue Algae, and Monera. Cell division is also based on the type of animal or plant cell because the two cells have differences. Discussion of cells in junior high school students only to the cell structure does not arrive at the mechanism of cell metabolism so that learning about the cell more directed at the visual side of students to recognise the parts of the cell and its functions. Visual media is more needed in the process of learning the cells of organ forms in cells to increase the visual literacy of the students.

Visual literacy is the ability and visual competence of human development that developed through sensory vision and experience are integrated at the same time so that they are able to interpret images and symbols, describe the activities of a person, objects, symbols around them and then communicate through creative action. Visual literacy is also capable of developing critical thinking skills in an individual because visual literacy includes the development of information, technology, and media literacy so that by applying visual literacy in conceptual and abstract learning process it is expected to increase the ability of science literacy [5-7]. The application of visual literacy in [4] et al's research applied a combination of learning drawing and also Picture and Picture (P & P) models in microbiology subject at university student. In the study, there is an increase in the conceptual knowledge in students. The utilisation of medium to enhanced visual literacy must conform to the visual literacy concept and the use of IT.

Augmented Reality application in the field of education can be used as a learning medium that is in accordance with the concept of visual literacy. Augmented Reality is a combination of Virtual Reality with World Reality so that virtual objects are two-dimensional or three-dimensional as if one with the real world. In contrast to Virtual Reality that makes the entire world of users in the virtual environment because Augmented Reality is just an additional reality and not replace the result is displayed interactively in real time [8-10]. Media Augmented Reality in the matter Cells can present abstract objects into 3-dimensional concrete forms. Cell objects that can be displayed are parts of animal cells and plant cells and their functions can be seen from all sides and their size can be zoomed (zoom in or zoom out).



There are two types of Augmented Reality marker-based and markless AR. Augmented Reality type marker-based AR basically requires a specific webcam and marker to determine the position of 3D objects in the real world. Markers in this app usually have iconic images. By detecting the marker for example placed on top of the book through the camera the virtual element will deliver to the Augmented Reality software so that the virtual element can appear in the book which can then be used and arranged through the connected computer [11]. When a virtual object cell has appeared on the label marker then the student can learn it.

Augmented Reality Development has been done by some previous researchers. Making Augmented Reality begins with the formation of 3-dimensional objects namely animal cells and plant cells using Blender software and create animations and then exported in .fbx format. The next step is to create a marker that will be where the object will be displayed. Markers that have been uploaded to the website Qualcomm developers and download markers with the unitypackage format which is then imported into Unity 3D. Good markers have a high contrast colour with the colour of the object. After the marker has been made, the use of Augmented Reality in the first stage is to run the human AR cell application and then display the marker that has been created. The marker will be captured by the camera from android and will be identified, if the marker has been matched then the object will appear [12].

The result of research using Augmented Reality as a learning media has shown a positive effect on students' behaviour and indicate the improvement of students' learning outcomes in affective, cognitive, and psychomotor spheres. In the psychomotor domain, the use of Augmented Reality media can make students use all the senses they have in learning activities and will make it easier for students to see the object becomes more concrete, clear detail, and intact. This is in line with the research that the classes taught using the Augmented Reality media have higher learning outcomes than the uneducated classes using Augmented Reality causes because in the Augmented Reality media students can see for themselves the object of observation so that they are able to find their own concepts [11-12].

The results of this study showed that the visual media based on Augmented Reality has a good effect in learning. Augmented Reality includes learning media that can be used to improve visual literacy in students. In addition, the use of Augmented Reality in the learning process will motivate students to develop their knowledge not only in science but also in technology so that the use of technology-based learning media will be able to increase human resources, especially in the field of technology.

Conclusion

It can be concluded that the use of Augmented Reality-based media can help students in the process of learning animal cell and plant cell materials so as to improve visual literacy in students.

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