e-ISSN 2963-2870
Vol 3 2022

DEVELOPMENT OF AUGMENTED REALITY MEDIA FOR THE HUMAN DIGESTIVE SYSTEM

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Abstract

This study aims to discover the opinions of learning media experts and concept experts from the digestive system in the developed Augmented Reality media. In addition, this research will also provide an overview of the experience of users who have used this AR media. The research method used in this research was mixed method research through Forum Group Discussion (FGD) and distributing questionnaires to experts and questionnaires consisting of 12 questions related to respondents' responses regarding the developed AR media. The number of respondents in this study consisted of 2 experts and 658 student respondents. The results of the expert's review of the generated media obtained 86.7% for the developed media and 90% for the concepts in the AR media. Meanwhile, based on the responses of the respondents, it was found that on average the respondents gave a value of 92.78%, which can be interpreted that the AR media developed is very good for studying the concept of the digestive system.

Keywords: Augmented Reality, Human Digestive System, Learning Media.

1 INTRODUCTION

Information and communication technology development allows for the modernization of the learning process (Midak et al., 2020). This renewal occurs in the learning media used in the learning process, which can make the process of knowledge and experience quicker to be understood by students (Rossano et al., 2020) Besides, this technological development positively impacts the quality of learning and education (Carbonell Carrera & Bermejo Asensio, 2017). Integrating technology into the learning process will certainly make the learning process more enjoyable, attractive and increase student motivation (Demitriadou et al., 2020; Midak et al., 2020).

Learning media has a significant role in making it easier for students to learn something, especially now that the world is in their hands because of smartphones and the internet (Alfadil et al., 2020). Currently, digital education is the most common approach because using media with increasingly advanced technology will make learning more exciting and can involve students more optimally (Chen et al., 2020).

In recent years educational research has focused on Augmented Reality media, or AR for short (Akçayır & Akçayır, 2017). This medium is considered promising in digital learning and developing constructivism theory. AR allows users to enter the artificial environment to create an interactive experience between virtual and real objects. The main purpose of this AR media is to

enrich sensory activity and feel the emotional factors of users to increase their involvement during the learning process (Jaber & Towfik, 2021).

Using AR media in the learning process can also improve student learning outcomes (Cazzolla et al., 2019) because the purpose of this media is to enhance the information we receive naturally through our five senses and augment it with the addition of virtual elements that are superimposed and constructed to carry complementary information and meaning that cannot be done naturally (Baran et al., 2020).

The development of AR media in this study focused on the material of the human digestive system. This study provides an overview of how the story of AR media on the human digestive system can help students better understand it based on the validation carried out by experts and respondents' responses. One of the complex concepts to learn is the human digestive system. Even though this concept is contextual to life, there are difficulties in understanding this concept. This obstacle is not only faced by students (Mauludin et al., 2017; Saputro & Saputra, 2015) but also by teachers and prospective teachers. Research conducted by Andayani et al., (2022) found that the understanding of prospective elementary school teachers on this concept must be further developed because it is included in the low category. Media development in this study also needs to consider the diversity of Elementary School Teacher Education students at the Open University. Students spread throughout Indonesia is a challenge in itself to develop interactive media based on technology and facilitate students in a more optimal learning process.

2 METHODOLOGY

The research method used in this study is the mixed method. Qualitative data were obtained from the Forum Group Discussion (FGD), and distributing questionnaires to experts to find out whether the developed media was appropriate or not to be used in the learning process. In addition, the quantitative approach was obtained by distributing a statement consisting of 10 indicators consisting of 12 questions developed Fadillah, (2018) dan Fatimatuzzahro et al., (2021) which can be seen in Table 1.

Table 1. Indicators and statement for Respondents.

No	Indicator	Question
1	attractiveness	The images of the organs of the digestive system presented to AR media are fascinating
		The choice of colors used in AR media regarding the digestive system is more interesting than the visualization in the module.
2	Benefit	Digestive system AR media helps me to study digestive system material
3	Enjoyment	I enjoy studying the digestive system using AR Media
4	understanding	After using Media AR, I understand more about the digestive system material
5	Material convenience	After using AR media, it is easier for me to understand the digestive system material
6	Development	I think the visualization development of the digestive system AR Media has been good
7	Practicality	Digestive system AR media makes digestive system material more practical to study
8	media convenience	I can easily apply the provided digestive organs AR Media
9	Material clarity	Explanation of material in digestive AR media is clearer and easier to understand
10	Legibility	The images of the digestive system organs presented in AR media of the digestive organs are in accordance with the images in the module
		I can easily read the writing in the digestive system AR Media

The FGDs conducted in this study were two experts in the field of Learning Media and Content from the human digestive system. As for the number of respondents regarding their responses regarding the media developed, 658 students were students in the Elementary School Teacher Education Study program at UT. Data analysis was carried out by presenting the data obtained and entering the value entered into the interpretation of the percentage of the results of the instrument being distributed. This interpretation is an interpretation developed by Rahayu et al., (2022) which can be seen in Table 2.

Tabel 2. Interpretation of Value or Percentage of Respondent

Range	Category
80 – 100	Very Good
70 – 79	Good
60 – 69	Enough
40 – 59	Less
30 – 39	Very Less

3 FINDINGS AND DISCUSSION

The results of this study were divided into the effects of two main discussions, there are judgement from the experts and student respondents.

3.1 Expert Review Results Regarding the AR Media that was developed

This initial section will discuss the assessment results given to the two experts. Giving to these two experts was carried out directly when demonstrating the use of the developed AR media. After conducting experiments on the AR Media.

Table 3. Media Expert Review Results

No	Indicator	Results	Category
1	Attractiveness	100.00%	Very Good
2	Enjoyment	80.00%	Very Good
3	Development	100.00%	Very Good
4	Practicality	80.00%	Very Good
5	media convenience	60.00%	Enough
6	Legibility	100%	Very Good
	Average	86,67%	Very Good

Based on the results of expert reviews with media experts, it is known that overall video shows in AR media have an average percentage of 86.67% in the very good category. Only one indicator is in a good category, namely the convenience of the media. Based on the results of interviews with media experts, it is felt that the media convenience indicator has not achieved a very good category because the AR media developed has not been able to reach PGSD students who are in frontier, outermost, and lagging areas. The results of the material expert's review of the material concept in the digestive system video shown in AR media are shown in Table 4.

Table 4. Material Expert Review Results

No	Indicator	Result	Category
1	Benefit	100%	Very Good
2	Understanding	80%	Very Good
3	Material Facilities	100%	Very Good
4	Material Clarity	80%	Very Good
	Average	90%	Very Good

From the results of the expert review of the material, it can be seen that, in general, the concepts used in the development of this media are very good, especially in terms of the indicators of the benefits and convenience of the material. This shows that the concept of the media being developed is following the concept it should be. The expert suggested adding Indonesian and scientific terms to adapt to the language generally used, such as the duodenum, jejunum, and other terms. So that later, students become accustomed to using biological terms that are generally used in explaining something.

3.2 Results of Student Responses regarding the developed AR Media

This second part will discuss how students respond to AR Media which was developed and includes ten indicators, namely Interesting, Benefits, Enjoyment, Understanding, Ease of Material, Development, Practicality, Ease of Material, Clarity of Material, and Readability. The results of what has been given to these respondents can be seen in Table 5.

Table 5. Respondent Response Results

No	Indicator	Result	Category
1	attractiveness	92,68%	Very Good
2	Manfaat	93,86%	Very Good
3	Benefit	93,80%	Very Good
4	Enjoyment	93,00%	Very Good
5	understanding	93,07%	Very Good
6	Material convenience	91,70%	Very Good
7	Development	93,53%	Very Good
8	Practicality	91,13%	Very Good
9	media convenience	93,01%	Very Good

No	Indicator	Result	Category
10	Material clarity	92,00%	Very Good
	Average	92,78%	Very Good

Table 5 shows that respondents generally responded positively to the AR media developed in this study. The majority, starting from attractiveness and readability, are all in the Very Good category, with an average score of 92.78%. This result shows that the use of AR learning media on the digestive system can help students to increase their understanding.

Based on the results of this study, it can be concluded that AR technology in the field of education can help achieve learning goals, as evidenced by the many studies conducted (López-Faican & Jaen, 2020). Users can learn from AR media and interact with them in real-time, making the learning process more exciting and enjoyable (Afnan et al., 2021). Wang et al., (2018) Explained that through this, AR media can present abstract learning in a real environment.

AR media is also suitable for education from elementary to secondary schools, but AR media is very convenient and adequate for various levels of education (Johnson et al., 2016). In line with this opinion, Garzón et al., (2020) stated that AR media has proven effective in teaching and learning. Many researchers have identified trends, opportunities, challenges, and the impact of this technology on education. However, what needs to be noted is the need for a pedagogical approach in the development of AR to be used so that the results provided are more optimal and beneficial for users of the AR media. Currently, AR media offers a new way to manipulate how students can interact with concepts more accurately. Through AR media, users can more optimally control the concepts they are studying in a clearer and more interactive manner (Kesim & Ozarslan, 2012). In addition, using AR media can increase the effectiveness and attractiveness of students' learning processes and experiences (Carbonell Carrera & Bermejo Asensio, 2017).

4 CONCLUSION

The AR media of the human digestive system developed in this study is suitable for use in the learning process because it is based on studies from learning media experts and content experts. In addition, the average response from respondents related to the AR media that was developed received a very good value which could mean that this AR media was effective in learning the concept of the digestive system.

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e-ISSN 2963-2870
Vol 3 2022