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ANALYZING EDUCATIONAL MEDIA DEVELOPMENTS' NECESSITY BASED ON AUGMENTED REALITY IN RELATION TO THE SUBJECT OF HUMANS' EXCRETION SYSTEM

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ABSTRACT

The objective of this study is to analyze students' necessity regarding the devolopment of Augmented reality on the topic humans' excretion system. This study utilizes the methodology of ADDIE as closure, however only the analyzation phase is proceeded, be it necessity and subjective analyzation. The subjects involved are that of the following; 2 Science Teacher and 46 eighth-grade students from Yadika 6 Junior Highschool in South Tangerang. The collection of Data obtained from the questionnares are analyzed quantitatively with percentages formula, meanwhile data obtained from interviews are proceeded through literature studying by qualitative methodology. This study results' indicates that 73,9% of students needs an education platform that is capable of visualizing real images. Results from Teachers' intrview shows positive encouragement towards the development of Augmented Reality as a media on Humans' Excretion system.

Keywords: Necessity Analysis, Augmented Reality, Human Excretion System.

A. INTRODUCTION

The development of Education have entered a crucial phase. Not only to offer an optimal and a great quality of service, but also to determine the continuation of Education itself. With the assistance of an advanced technology and information, Humanity managed to reach an era whereas information spreads with high acceleration rate, a global area coverage, as well as various digital media. Communication between individuals or groups could occur virtually which helps digital communication. There are atleast a few trends in Technology advance: Big data, cloud computing, Internet of things, Smartphones, and Social media. Currently, there are many activities that became easier due to the help of technology. The advance in technology could be utilized to help humans in various fields, that also includes Education. (Irawan, 2022).

Entering an era of Revolutional Industry 4.0 to Society 5.0, Education have transformed accordingly to changes and technology developments. During the current developments, the complexity of Teachers' role have increased. A Teacher's job is not only to deliver subjects to students in class, but also to conquer various technologies to assist learning process. Utilizing technology would aid students; learning process by helping them understand. There are a lot of strategies that could be developed with Technology's aid. Such as' online questionnares, Computer-Based Exams, Video Illustrations, Digital Projects, as well as the development of a Curriculum based on digital competency and skills. Therefore, it is important for a teacher to master technology and utilize it to support learning process (Kurniati, 2024).

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Society 5.0 also applies Technology as an assistant in learning, which would allow students to gain an easier access to information and increases the effectivity of studying. In society 5.0 learning, teachers act as a facilitator and motivator, not as the only source of knowledge. With this concept, there is a hope for the birth of a generation that possess high morality and quick adaptability in facing the everchanging world, in which complexity increases everyday (Kurniati, 2024).

One of many ways that could be done to reach the stated educational goal is to take advantage of learning media. Originally, Learning media is an important aspect in learning process, whereas learning media could act as a connecting bridge between teachers and students (Febriyanti, et.al, 2021; Miasari et.al., 2022; Trisiana, 2020).

Learning media is a tool designed to accelerate learning process by emphasizing and clarifying subjects delivered, as well as to reach an effective and efficient teaching in learning goals (Nurrita, 2018). Therefore, to achieve an effective learning media, the utilization of a technology is needed. As for the technology itself, it is a product of 4.0 Revolution (Ma & Liu, 2016; Verbruggen, Depaep & Torbeyns, 2021), that is Virtual Technology based off Augmented reality.

Augmented Reality is a media that utilizes and uses technology, IoT and digital in combining unreal and abstract objects in two and three dimensions, which are then visualized into the real world so that they can look concrete and blend with the real world (Azuma 2018; Valino 2018). The use of Augmented Reality technology is very useful as an interactive, direct and real learning medium for students. in other way, learning by using Augmented Reality learning media can increase student's interest in learning, because the nature of Augmented Reality which combines the virtual world with the real world can directly increase student's imagination. Interactive Augmented Reality allows students to see situations in a real way and be able to visualize the results of the learning that teachers provide to students (Iwan Maulana, 2019).

A research regarding the development of media based on Augmented reality have been done by (Agustine, 2023) results show that augmented reality as a learning media could help students lessen their boredom, allowing them to gain higher motivation in studying. This occurrence could happen due to the learning media visualising 3Ds form of respiration organs, as well as generating a quiz feature to assist students in understanding the subject. Other research results also reveal that Augmented Reality media has been able to significantly improve student learning outcomes, especially in the cognitive domain (Qorimah & Sutana, 2022).

Therefore, based on previous researches done, it could be concluded that Augmented reality as a media holds various positive influence and benefits in increasing motivation and students' cognitive function. However, there has been no research that studies and analyse the necessity for the development of learning media based on augmented reality (Esti Nur, 2022). Due to the reason, it is crucial for further research to be implemented regarding the development of augmented reality as a media. As for the purpose of this research is to acknowledge students' and teachers' needs in developing Augmented reality as a media in relation to the subject Excretion system.

The reason for choosing this material is because the excretory system material is

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less popular and even tends to be boring because it requires students to memorize terminology and Latin to introduce the organs involved in the human excretion process (Simorangkir, Napitupulu & Sinaga, 2020). This is also supported by research (Amini, Nasution, Mulkan & Sugito, 2018) which states that the excretory system material is one of the materials whose concept is difficult to understand, because it has a lot of memorization, terms and mechanisms.

B. METHODOLOGY

This study takes form in research and development (R&D), that is developed with ADDIE as the model. ADDIE is composed of five phases; Analysis, Design, Development, Implementation and Evaluation (Rahmat, 2019). However, this study exclusively utilizes the Analysis phase to gather informations. In this study, the analysis towards the necessity of students and teachers are done. The subjects of this study are 2 Teachers and 46 Eighth-grade students from SMP Yadika 6 Pondok Aren.

Data collection will be carried out with Literature Study, Questionnares and Interviews. The instruments used are necessity Questionnare sheets for students, and necessity interview sheets for teachers. Data obtained in this study will then go through an analyizing process with descriptive quantitative and qualitative methodologies. Quantitative analyzation is implemented to analyize questionnaire results using precentages formula, meanwhile, qualitative analysis is carried out by descripting results of the research and find relations with previous researches' results.

C. RESULTS AND DISCUSSION

1. Results

The research regarding learning platform based on Augmented Reality in relation to the subject of excretion only reached subject analyisis phase, as well as teachers' and students' necessity. The purpose of necessity is to gather information on the problems that occur during learning and their causes, the application of learning materials and its imperfections (Yudhi, 2017). However, material analysis in this study would be divided into two regions: curriculum analysis and conceptual analysis. The results of necessity's analysis is used to determine alternative solutions and recommendations for the augmented reality media that will be implemented. See below for material data analysis and identified needs:

a. Curriculum Analysis of the Human Excretory System

The subject chosen for this learning platform innovation is Humans' Excretion system. This is based on the abstract charactization of subjects filled with series of processes that involves the organs of a human's body, therefore, it is necessary for it to have a learning media that is able to assist students to understand this subject (Qumilaila dkk, 2017). For the origin's phase, an analysis is done to understand the curriculum applicated at the present. With Independency Curriculum (Kurikulum Merdeka), there is an educational goal to achieve that would also be the hope after learning is done. With the achievement of learning the subject humans' excretion system for grade VIII being; "Students are able to do an analysis to find relation between the organ system with its'

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functions as well as abnormalities or disturbance that happens on excretion organs." As for the specification for the goal of learnings that could be achieved, that is students are expected to:

1) Explain the structure and functions of humans' kidneys,
2) Explain the mechanism of urine production and factors that affects it,
3) Explain the structure and relation of the Lungs as a tool for Excretion
4) Explain the structure of the human skin as well as its functions, analyze the production of sweat and the factors that affects it,
5) Explain the liver especially in its relation with its function in human excretion system,
6) Identify abnormalities and diseases that happens on the human excretion system as well as determining the means to maintain humans; excretion system health.

b. Conceptual Analysis in Humans' Excretion System

Concept analysis aims to classify and find out which concepts are abstract and concrete. This concept analysis is also used as a basis for developing Augmented Reality media. The concept analysis of the human excretory system is presented in Table 1.

Table 1. Conceptual Analysis of Humans' Excretory System

No	Concept	Definition	Concept Classification
1	Excretion System	A system that dispose waste produced by cellular metabolism	Abstract
2	Kidney	A pair of organs that functions to produce urine	Concrete
3	Skin	An Organ in the human body that functions as a shield and a temperature regulator.	Concrete
4	Liver	An organ that helps the digestion system and metabolism.	Concrete
5	Lungs	A vital organ in the human body that functions as a respiratory and excretory organ.	Concrete
6	Filteration	The blood filtering process occurs in the glomerulus, the part of the kidney that functions to filter waste from the blood	Abstract
7	Reabsorbtion	The process of reabsorbing substances the body needs from primary urine which has gone through the filtration process	Abstract
8	Augmentation	The final process in the formation of urine, where water, NaCl salts and urea will be filtered again	Abstract
9	Co_2	A chemical compound consisting of one carbon atom and two oxygen atoms.	Abstract
10	Urine	Waste fluid that is produced by the kidneys and excreted from the body through the urinary tract	Concrete
11	Sweat	Cairan yang dikeluarkan oleh kelenjar	Concrete

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		keringat pada kulit manusia untuk mendinginkan tubuh. A fluid excreted by the sweat glands in the human skin that aims to lower body temperature.	
12	Bile	A Yellow-green digestive fluid produced by the liver and stored in the gallbladder	Concrete

c. Analysis of students' and teachers' necessity towards the subject humans' excretion system

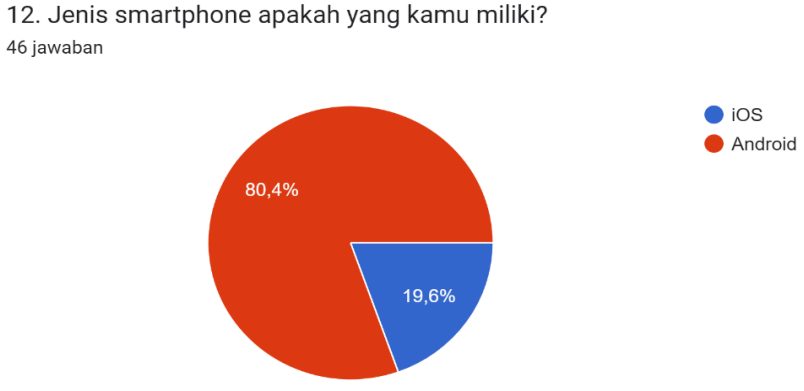
Necessity Analyzation is done to gather informations regarding issues that happens in learning as well as the causes, the application of teaching as well as the errors that happens, subjects given and the imperfections (Yudhi, 2017). Results of the necessity analysis would be used to determine alternative solutions and the specification of recommended Augmented reality that will be developed.

1) Analyisis for the learning media used at school

Picture. 1 the use of learning media's pie chart.

Based on the results of Picture.1, it is shown that learning media used by teachers are that of the following; 63% uses power point, 8,7% uses the whiteboard, 6,5% uses printed books, and 4,3% work sheets. There is a direct knowledge obtained from the data above, that previously, in learning process, teachers mostly utilize powerpoint and whiteboard as a media In teaching science.

2) Analysis of smartphones availability.



Picture. 2 Pie chart for the availability of smartphone.

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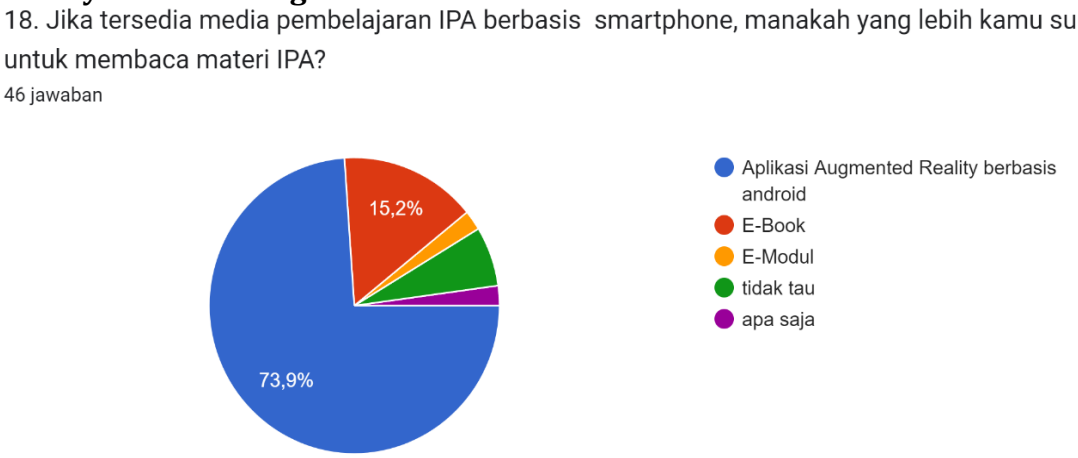
In terms of smartphone operating system present as of now, it could be divided into two types: Android OS and iPhone. According to picture.2, around 80.4% of students own an Android smartphone and 19.6% own an iOS device.

3) Analysis of students' smartphone utilization

Picture. 3 Pie chart for the utilization of smartphone

According to Picture.3, 43.5% of students use smartphones for social media, 15.2% for chatting, 10.9% for gaming, and 6.5% for learning.

4) Analysis of learning media's criteria needed



Picture. 4 Pie chart for the necessity of learning media

Based on the results, we can see that 73.9% of people prefer augmented reality apps to learn science. Then, approximately 15.2% of students purchased an e-book, and the rest chose an e-learning module.

5) Analysis for teacher's necessity towards learning media.

Data obtained from interviews is given descriptively, and these are the following results from the interview for teachers at SMP Yadika 6 Pondok Aren.

Table 2. Analysis for Teacher's necessity towards Augmented reality media

No	Researcher's Question	Answer
1	Is the subject of human's excretion system is included into subjects that	It's not actually hard, but it is more abstract, there are many terms that

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	is difficult or easy to study by students?	students have yet to understand, furthermore to describe the imagery details for excretion organs on humans and the process of urine filteration.
2	What kind of media that teachers mostly use in teaching?	Media used is often Power point, sometimes the whiteboard as well.
3	What is the function of media in teaching?	To accelerate the interaction between teachers and students, so that learning activity would be more effective, then, dtudents would also be more interested to study.
4	Are students allowed to bring gadgets to school?	Yes, they are allowed to as long as it is necessary to search for information and to study.
5	Do teachers know about Augmented reality?	I have only known it due to the researcher.
6	What Is teacher's response If there is a teaching media based on augmented reality?	Very good, since that media is yet to be available in this school, maybe students would be more motivated and gain higher curiosity compared to previous media that they have used In class.

According to Table 2, teachers require innovative learning media in the learning process to motivate students to learn and understand the material. Furthermore, students want innovative learning material in the learning process so that they can learn in an independent and interactive manner.

2. Discussion

Science subject that utilizes digital technology could offer students a facility to study with more interest and interaction. Strategy and methods for learning would be a factor that could affect teachers in teaching in class. With the advance of digital technology, teaching methodology could be improved with the integration of digital technology as a part of science as a subject.

Digital technology owns an important role in teaching science due to its possibility to offer an easier and faster access in delivering information or science subjects. With the help of digital technology, abstract science concepts could be explained and visualized through pictures, animations and videos. This visualization assists students to understand difficult concepts through oral speaking or texts (Irnin;kunto;ivan;teguh, 2023).

The first discovery, Based on learning achievements and the specifications for excretion system as a subject, there are abstract sub-chapters with many terms that students have yet to understand. This is also supported by teachers' statement in the interviews that states; that some part of the subject that tends to be more abstract needs further description towards the imagery details for excretion organs on humans and the process of urine filteration. Furthermore, Santriana elaborated that the subject excretion system is a subject that is assumed to be difficult to understand directly due to the abstract concepts, for example; the mechanism of an organ as an excretion system and the concept related to the structure and human body physiology (Santriana, 2014).

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The abstract concept is often difficult for students to grasp due to the lack of specific examples. As a result, in order to facilitate understanding of abstract learning concepts, a learning media capable of critiquing various abstract concepts in learning material is required (Shofa et al., 2020). Aside from that, learning media can boost motivation and desire to learn, as well as improve academic performance (Hazarida et al., 2015).

The second discovery from the research is that students and teachers require augmented reality (AR)-based learning resources. This is due to the fact that students and teachers require media that can explain learning material and have appealing visuals in order to increase student interest in learning. The results of the study show that the guru is the first to use augmented reality media from the researchers. Media augmented reality that has been developed is yet to be used by teachers as a medium to aid in the process of science learning. Because of the importance of augmented reality learning media, students and teachers are encouraged to develop it so that students can learn about the system in real time.

There are relevant and related studies that have been conducted previously, such as: 1) Augmented reality as an educational game application to introduce humans' organs could increase the desire to study (Sudarlimah & Wibowo, 2016). 2) By utilizing augmented reality technology, students can obtain more timely and accurate information. As a result, this media can meet the needs of students in understanding and observing the learning process and learning materials (soepriyanto et al., 2017).

D. CONCLUSION

Based on the results of the needs analysis used as the foundation for the development of augmented reality media on human systems, it can be concluded that the needs analysis of students and teachers must be expanded in order to facilitate the delivery of the human systems in their entirety. This is based on the results of a survey of 73.9% of students who are interested in augmented reality media, as well as the results of an interview for teachers who believe that augmented reality media should be used in science education, particularly in the field of human systems.

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