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Investigation on Teachers' Perception of Augmented Reality as Interactive Media for Science Learning

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Abstract: This article aims to find out the teacher's perception of *Augmented Reality* (AR) as an interactive science learning medium that can stimulate students' curiosity, passion and motivation, especially in the era of Covid-19 learning where learning is limited. This article used qualitative methods with a descriptive approach. The subjects in this study were 10 junior high school teachers with different grade levels in the city of Makassar. The study data was obtained using questionnaires sent via google form links with 20 question items. The results showed that indicator method used of science lessons, media used od science lesson, knowledge of AR media, fesibility AR media as science lesson, got an average score of 70 with excellent categories, 83 with excellent categories, 62 with Good categories, and 80 in excellent categories. So it can be said by applying AR media to Science materials believed to be able to foster the spirit and motivation of students so as to create an effective learning atmosphere.

Keywords: teachers' perception, augmented reality, covid-19 pandemic.

Abstrak: *Artikel ini bertujuan untuk mengetahui persepsi guru mengenai Augmented Reality (AR) sebagai media pembelajaran Science yang bersifat interaktif yang dapat menstimulus rasa ingin tahu, semangat dan motivasi siswa, khususnya di era pembelajaran Covid-19 yang pembelajarannya terbatas. Artikel ini menggunakan metode kualitatif dengan pendekatan deskriptif. Subjek dalam penelitian ini 10 guru SMP dengan tingkat kelas yang berbeda di kota Makassar. Data penelitian ini didapatkan dengan menggunakan kuesioner yang dikirimkan melalui link google form dengan 20 item pertanyaan. Hasil penelitian menunjukkan bahwa indicator method used of science lessons, media used od science lesson, knowledge of AR media, fesibility AR media as science lesson, mendapatkan rata-rata skor 70 dengan kategori sangat baik, 83 dengan kategori sangat baik, 62 dengan kategori Baik, dan 80 pada kategori sangat baik. Sehingga dapat dikatakan dengan menerapkan media AR pada materi Sains dipercaya mampu menumbuhkan semangat dan motivasi siswa sehingga dapat menciptakan suasana pembelajaran yang efektif.*

Kata kunci: *persepsi, augmented reality, pandemi covid-19.*

▪ INTRODUCTION

The Coronavirus Diseases (COVID-19) outbreak is a global pandemic that affects many countries in the world in 2020 (Kwasi Ahorsu et al., 2020). This outbreak occurred due to a new type of coronavirus infection that began in China, precisely in Wuhan (Tian et al., 2020). The virus began spreading in several countries in early 2020 and entered Indonesia in March 2020. On March 11, 2020, WHO declared the outbreak a global pandemic. Until now, globally the death toll reached 316,860 people and in Indonesia has penetrated to the number of 1,192 people (data as of May 18, 2020) (Syaharuddin, 2020).

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With the COVID-19 outbreak, learning activities in several major cities and small towns in Indonesia became disrupted. Students end up unable to study in school because all schools are closed from elementary, middle, to college. Learning activities also turned into online-based learning or called electronic learning (e-learning). This e-learning strategy is carried out in various ways ranging from using websites, social media, to teleconference (Alhawiti & Yasser Abdelhamid, 2017). E-learning is a very appropriate choice to promote the sustainability of education and learning process for students during the covid-19 pandemic (Alhawiti & Yasser Abdelhamid, 2017).

Science learning is a science that contains facts, concepts, principles, laws and theories. The learning process of science not only studies material that is concrete but also abstract. Abstract learning materials are materials that cannot be taught directly because students cannot see or display them for real so students will find it difficult to understand the theory (Karina, Irawan, & Hindrasti, 2020). Each subject matter is always related to the medium of learning characteristics both from the simple to the most complex form. Ideal learning occurs with the mutual relationship of teachers and students, students can understand the material provided by the teacher with an enthusiastic response from students. In addition, students can exchange ideas with other friends. So that in face-to-face and online learning is expected to be lively and have good feedback, because the purpose of good learning must certainly reflect the attitudes, knowledge and skills that students gain during the learning process. According to (Richey, 2001) The goals of learning itself is knowledge, skills, and attitudes that require students to perform certain job tasks and functions that conform to the standards set by the school itself.

With us following the existing phenomena, 2021 is the alpha (α), of which the generation is very dependent on technology. So that the role of technology this year is very large in various aspects in the world including the field of education. According to (Gómez,2017) . Technology has been widely used around the worls and can affect a person's perception of the learning process. The application of technology in the learning process requires teachers to able operate technology in the field of education, and that will be a challenge for teachers. (Ghavifekr,2015) stated that, technology in the field of education plays a very high role because with the help of technology, the teaching and learning process can be done not only in school but also when teachers are far from students (online). Therefore, technology holds an important role in the field of education, teachers must be technologically literate in the education and use of technology that has been widely used in various aspects of our lives.

One of the technologies that almost everyone has is mobile technology. Mobile technology has entered every activity carried out by students or society. Mobile technology that can be accessed anytime and anywhere. Mobile technology has also penetrated into the world of education, where the use of mobile technology can develop various ways of learning students both in school, at home and in the community, interacting with others, sharing information and sharing, absorbing information from various sources, improving the understanding of student concepts, and academic achievement of students in the learning process (Han & Shin, 2016).

Based on the questionnaire distributed by researchers through google form (Gform) to secondary school students related to mobile technology owned in this case intended mobile phones owned by students obtained the result that 97% of students have android type phones and the rest types of IOS. This means that the use of mobile technology in learning will be very possible if used, 70% of students think science learning in the pandemic era is more difficult than offline. 91% of students also think the use of ICT

media in the science learning process needs to be used because most SCIENCE learning is only taught to the extent of the provision of materials and tasks through Whatsapp Groups and questionnaire results distributed through gform to secondary school Science teachers in Makassar City explain that teachers teach the concept of science only by using material books owned by teachers and students, While ICT-based learning is only a small number of teachers and LKS owned by students then provide exercises based on the book. One creative way to answer the problems in schools today is to utilize technology in the field of education by using media. The use of technology as a learning medium has been widely used so that teachers create and decide the right media to be used in accordance with existing material concepts. With the help of technology, teachers have various options in choosing the type of media that suits the meteri, current technology has also offered various types of applications related to the field of education that will support the learning process.

In this modern age, people are often familiar with up-to-date technology that can help them understand certain information, providing benefits that can maximize their time. Similarly, it is necessary to provide an innovation in learning media to help the learning process online and offline during the covid-19 pandemic. Mobile technology-based media is one of the best solutions considering the very high use of mobile technology among students and teachers. Mobile media in learning can help teachers explain Science concepts and improve students' conceptual understanding.

One of the learning media that is seen as helpful and can facilitate to facilitate students in learning abstract material is augmented reality media (Ismail, Festiana, Hartini, Yusal, & Malik, 2019). Augmented reality is an attempt to combine the real world and the virtual world. (Fernandez, 2017) stated that virtual reality and augmented reality have entered the field of education. This can provide students with a deeper understanding of information, such as transportation that will help to deliver passengers to their speed. In contrast to augmented reality that uses the environment directly in real terms, so students who use Augmented Reality in their teaching and learning process will be more contextual and understand the learning process more.

In line with the research conducted by Didik et al (2019); Macariu et al (2020) in its study aimed at demonstrating how effective AR applications are in Romanian education systems. The results state that Augmented Reality has been accepted as an effective learning method which means it can be a complement to conventional learning especially in the field of chemistry, where the fact that augmented reality is an interactive experience of the real-world environment, and augmented reality applications attract more students in class, supporting conventional teaching methods.

According to (Quintero, Salinas, & González-Mendívil, 2015) Augmented Reality is a new technology that involves virtual images in the real world. AR is particularly useful in learning environments in schools and classrooms that can allow students to interact directly with digital materials, and gain skills in the ntata world (Lee, Teo, Kim, & Billinghurst, 2017). One of the ways AR can be used is that it can provide visuals in three dimensions that can allow students to acquire visual geometric skills related to geometry education. Visuals in this ar are very helpful for students to understand the concept of geometry (Gürbüz, & Gülburnu, 2013). Abatract concepts, shapes and objects that are not easily seen in the real world can be displayed by displaying three-dimensional virtual information, at low cost (Ibili, Resnyansky, & Billinghurst, 2019)

But it is necessary to advise institutions or teachers to be aware of technological developments and facilitate the current technological phenomenon of students.

Institutions or teachers can hold seminars on the latest technologies in teaching the younger generation such as how to utilize technology in language learning, current technological phenomena in language learning and also provide them with brief and clear information that technological media provides the most beneficial advantages for them according to the level of students. So it is very important to know how students and teachers' perceptions of current technology media and the level of how they feel when joining the classroom are helped by technology media. In addition, understanding the perception of students and teachers also provides a clear answer to the technological media used, whether it is acceptable or not.

According to (Devito, 2011) perception is a way that can make a person become aware of the many stimuli or stimuli that can master one's senses. Perception is basically a cognitive process that is experienced by a person when understanding information about the environment, be it through the sense of vision, feeling, listening, imagination and smell (Thoha, 2014). Perception can be defined how a person thinks about certain information, related to one's knowledge, and experience. Everyone has different perceptions even with the same object, because everyone's knowledge and knowledge of the object is different.

(Thiagarajan, 1999) states that to understand the interests of students, of course, requires teachers to attract students by using current technology in delivering subject matter. In addition, the current use of technology as a medium and understanding student perception is very important because of its effects in various fields, especially the field of education such as teachers, students and also technology itself as a medium. In other words, perception is the process of interpreting form. Stimulation in the form of reactions or behaviors when received Stimuli received by the sense tool. It is known that different eras will result in different perceptions of students and teachers. Based on the description above, the author is encouraged to conduct research about teachers' perception on augmented reality.

▪ METHOD

This research is qualitative research with a descriptive approach design that used survey methods. This research aims to investigate the perceptions of some secondary school Science teachers regarding Augmented Reality media if applied in the teaching and learning process as an interactive learning media and can increase student motivation and liveliness. Qualitative research is a study that produces descriptive data in the form of words from a person's mouth and written word and observable behavior (Slameto, 2010).

According to (Sugiyono, 2010) descriptive statistics are statistics that serve to describe or give an overview of the objects studied through sample or population data as they do analysis and make generally accepted conclusions. Respondents to this study were 10 science teachers in Makassar City with different class levels. People consisting of 3 teachers of class VII, 5 teachers of class VIII, and 2 teachers IX. This science teacher is a teacher who has experience teaching at various levels of educational units with different teaching durations.

The instrument in this study is in the form of the dissemination of a questionnaire instrument containing 20 statement items who sent directly through google form about teacher perception of augmented reality as media interactive. The questionnaire in this study used the Likert scale that has been validated by expert judgment. The data in this

study was obtained directly from the research subjects. Table 1 shows the number of statements perception items per indicator

Table 1. Number of statements per indicator

No	Dimension	Instrument	Number of questions
1	Method used of science learning	Teachers perception of AR media	5 item
2	Media used of science learning	Teachers perception of AR media	5 item
3	Knowledge of AR media	Teachers perception of AR media	5 item
4	Feasibility AR media as science learning	Teachers perception of AR media	5 item

As for looking at the average criteria of teachers perception of media AR as media science interactive with categories on each indicator, it can be seen based on criteria with grades 0-25 is a very low category, 26-50 low category, 51-75 high category, and 76-100 is an excellent or high category (Sinaga, 2017)

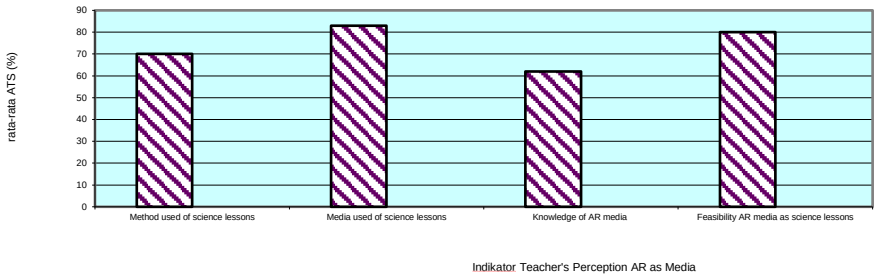
▪ RESULT AND DISCUSSION

Based on the Results of research, where teachers are asked to fill the needs of Augmented Reality media as an interactive science media, in order to investigate the perception of IPA teachers in the city of Makassar in the era of the Covid-19 pandemic. Which results are obtained as in table 2 below

Table 2. Average score of teacher's perception

No	Indicator	Average Score (%)	Category
1	Method used of science learning	70	High
2	Media used of science learning	83	Excellent
3	Knowledge of AR media	62	High
4	Feasibility AR media as science learning	80	Excellent
	Overall average score	73.75	Excellent

The amount of teacher perception of AR media at the time of learning in the pandemic era is 73.75% which is in the very good category that has been interpreted based on the criteria obtained as shown in table 2 above. The graph 1 below shows the comparison of teacher perception of each indicator of teacher perception fulfillment, which is made up of method used of science learning, media used of science learning, knowledge of AR media, feasibility AR media as science learning.



Graphic 1. Average score of each respondent

Indicator Method Used of Science learning

In the indicator method used of science learning shows that the method used by teachers during the covid 19 pandemic is ongoing, which has an average score of 70 (graph 1) which has very good or excellent. Where in this indicator shows teachers in the current pandemic there are already some schools that do hybrid learning (online and online) but the learning process is still conventional and teachers still feel the need to adapt to the current learning methods, generally the methods that are experienced are conventional, where teachers explain and students only as listeners. In the case of science learning, most students are required to be able to think abstractly, so students need a method of learning that is able to bring a depiction of objects in real or 3D. but the teacher has not been able to provide adequate facilities.

Online learning carried out during the pandemic period teachers are required to be good at creating in bringing materials that will be taught, so that learning innovation is needed both in terms of methods, models, strategies to the media so that students can still feel the spirit in learning even though learning is done remotely. Science learning that contains facts, concepts, principles, laws and theories. The learning process of science is not only learning material that is concrete but also abstract. Abstract learning materials are materials that cannot be taught directly because students cannot see or display them for real so students will find it difficult to understand the theory (Karina et al., 2020). Science learning is characteristics of science that require understanding concepts that make learners assume that ipa lessons are difficult lessons. Therefore, teachers see the need for an interesting method to be able to stimulate students so that the learning environment can be conducive. .

Indicator Media Used of Science Learning

In the indicator media used of science learning shows the media used by teachers when doing learning during the pandemic covid, which has an average perception value of 83 which has a very high category or excellent (graph 1). This means that teachers are quite literate about the function of media in learning, especially science learning. Of course, not only methods that need to be considered in the learning process but the media must also be the main highlight that teachers need to pay attention to. Because the attractive media will certainly attract the attention of students, both during the online and offline learning process.

Learning media has been widely used by teachers such as books, PPT, and some other props. But because currently pandemic covid takes place of course hinders the process of carrying this media, which when online is needed a technology-based media.

(Ghavifekr & Rosdy, 2015) stated that, technology in the field of education plays a very high role because with the help of technology, the teaching and learning process can be done not only in school but also when teachers are far from students (online). Therefore, technology plays an important role in the field of education, teachers must be technologically literate in the education and distribution of technology that has been widely used in various aspects of our lives.

Based on questionnaires distributed by researchers through google form (gform) to junior high school students related to mobile technology owned in this case intended mobile phones owned by students obtained the result that 97% of students have android-based mobile phones. This means that the use of mobile technology in learning will be very possible if used. 91% of students also think the use of ICT media in the IPA learning process needs to be used because most IPA learning is only taught to the extent of providing materials and tasks through Whatsapp Groups or (GC) and google classroom. So that the students feel very saturated in doing learning. They need a fresh technology media.

Technology media also plays an important role in helping teachers in delivering materials and managing teaching time. Teachers must be more creative in the teaching and learning process, one of the creative ways in doing teaching is to use media technology to attract students and motivate them in joining the classroom. Technology plays an important role as a medium in the teaching and learning process so that teachers or educators must follow and be able to be creative and aware of the momentum in teaching the younger generation by using creative education technology as a media (Frau-Meigs, 2006).

Indicator Knowledge of AR media

In the indicator of knowledge of teachers about AR media has an average perception score of 62 that has a good or high category (graph 1). It can be said that teachers who are in school already quite understand the importance of the use of this technology-based media, they are quite up to date but for AR media itself they still feel lay but their level of interest in the media is very high, because the media can display real objects in 3D and packaged there is interesting. (Sural, 2018) in his research also stated that the level of teacher knowledge about AR where most young teachers have sufficient knowledge (56.1%) about AR technology. However, these results show us that more than half of teachers have knowledge of AR still at the elementary level.

Revolution 4.0 era there is a new and contemporary breakthrough media that integrates with technology. This media is called Augmented Reality media, which means according to (Quintero et al., 2015) Augmented Reality is a new technology that involves virtual images in the real world. AR is particularly useful in learning environments in schools and outside the classroom that can enable students to interact directly with digital materials, and gain skills in the real world (Lee et al., 2017).

So it can be said based on the results of this survey shows us that although teachers have a good knowledge of technology-based media are quite high such as smartphones and laptops, although they feel lay about this AR media information but after they pay attention to this media they are quite familiar with this media, because most of them have used AR in the version of games that have gone viral in their time, namely Pokemon Go and there is even 1 in 2019. The teacher claimed that once using AR technology while in the supermarket, he was asked to barcode the AR code to find out the composition and

expiration date of a food but for his own name and details they are still lacking in the media.

Teachers have never seen even using AR media packaged in learning process. After using augmented reality materials in this IPA learning, the teachers are very excited and state that augmented reality has great potential to be used in teaching and learning materials. Also, they stated that they wanted to see AR technology in a variety of other materials, not just Science of course. This of course makes teachers very much looking forward to the development of AR technology packaged in science learning that is believed to foster spirit, motivation, attention to the results of other learnings.

Feasibility AR media as science lessons

In the indicator of the feasibility of AR as a science learning media got an average perception score of 80 is very good or excellent. Which means that teachers assess the feasibility of AR media is very good and very accepted. Based on indicators of AR as media science learning, the average value of teacher perception of 80 is categorized as very high or excellent. This is because teachers are very interested in AR media, which obtained the results of 80% of teachers strongly agree to apply AR as a medium that can support science learning later and cover the shortcomings in other media. This is with research (Gürbüz, R., & Gülburnu, 2013) which states that AR is perfect for use because it can provide visuals in three dimensions that can allow students to acquire visual geometric skills related to geometry education. Visuals in AR are very helpful for students to understand abstract concepts, shapes and objects that are not easily seen in the real world can be displayed by displaying three-dimensional virtual information, at a low cost (Ibili, E., Resnyansky, D., & Billinghurst, 2019).

AR is believed to be a technology that can fill the gap between the virtual and physical worlds. It is generally defined as "an interactive device between a human and a computer, which has been developed by computers in a real-world environment (Göksu, 2013). Collaborative learning activities can be done with AR. This system encourages teachers and students to interact, and work together. Furthermore, students find it easy to learn because it is supported by experimental scenarios, and visualization skills are improved.

In fact (Delello, 2014) said in his research, some teachers argued that "Augmented reality is not only amazing, but also free and easy to do and (97%) of respondents said that they like the media tool and plan to continue using it. One student stated, "I really like this project and hope to create more images on this AR medium and want to continue using the program. Even (Jati, 2019) in his research that states that teachers perceive differences of opinion about the advantages and disadvantages of Augmented Reality media in learning, which is where teachers perceive some of the advantages of AR media that are able to motivate students to learn English, improve student performance in understanding the subject matter, increase students' enthusiasm for the material, and can attract students and their teachers in learning. But the shortcomings of AR media can also be felt by teachers as they need more knowledge about AR media, media technology that is difficult to operate for students, and ar media is difficult and students are also not accustomed to it.

It is important to know how students' perceptions of current technological media and the level of how they feel when joining the classroom are aided by technology media. In addition, understanding the perception of students also provides a clear answer to the technological media used, whether it is acceptable or not. It is known that different eras

produce different students. It is advisable to conduct similar research with different classes of students to find out their perceptions using technological media such as augmented reality. One of the advantages of AR media in education is that it provides education 'everywhere every time', which is cheaper and physically smaller than a desktop computer because it offers more engagement to students who are familiar with the modern.

▪ CONCLUSION

This study aims to investigate teachers' perceptions of the use of Augmented Reality media if applied in the science learning process as an interactive media that can increase students' motivation, passion and curiosity, as well as find out whether the use of AR media is suitable to be applied to all science material it self even in the era of pandemic covid-19. Which is where from the results of data analysis that has been done based on ar media needs instruments filled by junior high school teachers in makassar city. The results showed that indicator method used of science learning, media used od science learning, knowledge of AR media, feasibility AR media as science learning, got an average score of 70 with excellent categories, 83 with excellent categories, 62 with Good categories, and 80 in excellent categories. So it can be said by applying AR media to Science materials believed to be able to foster the spirit and motivation of students so as to create an effective learning atmosphere. So that this AR media is very well received and trusted to be able to foster great and motivation in students so as to improve student learning outcomes.

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