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Student scientific attitudes towards protected flora and fauna in augmented reality-based biodiversity learning

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Banten;
Biodiversity;
Augmented Reality;

Abstract

Indonesia has an unique and interesting geographical position, which is characterized by a rich variety of flora and fauna. One of the wealth of biodiversity is rare protected flower plants (Endemic Flora) where hunting and illegal trade are some of the factors that cause biodiversity to be threatened. Due to the fact that the threat and extinction of biological resources is increasing, the status of a species' scarcity is determined. Banten is known for its diversity of animals, but because there is a lack of media to introduce endangered species in Banten, the existing endangered species are not known, so they are threatened with extinction. This study aims to describe the scientific attitude of students on the theme of Protected Flora and Fauna in Banten in Augmented Reality-Based Biodiversity Learning. This type of research is quasy-experimental research with nonequivalent control group design. The study population was all second semester students majoring in Science Education who took the Biodiversity course with a purposive sampling technique. The research was carried out in the even semester of 2022/2023. Data collection techniques used non-test techniques, namely scientific attitude observation sheets and scientific attitude questionnaires. The results showed that the scientific attitude of science teacher candidates based on discussion observation sheets obtained an average score of 86.88% in the good category, while the scientific attitude based on the questionnaire obtained an average score of 78.88% in the good category. The highest scientific attitude dimension possessed by students is the dimension of respect for data or facts, while the lowest scientific attitude possessed by students is the attitude of perseverance.

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Introduction

The rapid development of information and communication technology in the current era of digitalization has had the effect of changing various aspects of life from conventional to digital, making it easier for all forms of human activity as well as in the field of education. Digitalization has had an extraordinary impact on the world of education, one of which is from teaching methods that were previously conventional to education that no longer depends on

school buildings and infrastructure, but a wider information network that allows interaction and collaboration to occur (Nugroho, 2014).

Education is currently required to be able to adapt entirely to conducting distance learning, so teaching and learning activities really need learning media that can increase the efficiency and quality of education (Elyana, Andhika, & Ori, 2022). In line with the development of information and communication technology that took place during the Covid-19 pandemic yesterday, the world of education began to innovate teaching and learning activities by using various media and technology-based learning resources assisted by computer devices or Computer Assisted Instructions (CAI) which were interesting and fun. for students. As for one of the media and learning resources assisted by computer devices or CAI, which is still new, namely media and learning resources that use Augmented Reality (AR) technology (Maulida, 2022).

A technology known as augmented reality may connect the physical and digital worlds, as well as the actual and virtual items that exist there. To create a 3D image, a view or vision of the environment on which the virtual object will be imaged must be performed first by the augmented reality system (Karundeng, Mamahit & Sugiarso, 2018). With this, users no longer need to worry about the availability of special markers to run this application so that it will make it easier for users to get information and visual forms of rare animals Augmented Reality which presents 3-dimensional (3D) shapes and animal animations that make objects look real so they can attract the user's attention to know and learn about it (Mongilala, Tulenan & Sugiarso, 2019).

Augmented Reality technology can currently be used on mobile devices such as mobile phones which are the closest technological devices that are often used daily by everyone so that the use of Augmented Reality technology-based media and learning resources using mobile devices has a great opportunity to create new experiences. In learning for students and makes it easier for educators to deliver material online and offline (Indarta et al., 2022). Augmented Reality can be used to visualize abstract concepts into a real environment in real time (Hermawan & Hariadi (2015). In its development, AR technology is widely used in various activities, one of which is in the field of education for subjects with lots of abstract material. which requires more in-depth visualization (Mustaqim, 2016). Chiang, Yang & Hwang (2021) described that the role of the VFT method in learning activities is to improve the teacher-student interaction process and the environment learning by using technology as a teaching aid. The Biodiversity course is material whose scope is very broad so learning media is needed that are easy to use and more in-depth so as to facilitate the delivery of material (Wahyuni et al., 2022).

The Biodiversity course explains the diversity of living things which shows the overall variation of genes, species and ecosystems in an area that is not always around students, for example, such as rare and protected flora and fauna that only live in their natural habitat (Wahyuni et al., 2022). In this case, students who live far from the original habitat of flora and fauna will find it difficult to recognize and study protected flora and fauna in Banten, so that in order to understand students, learning media is needed that is able to present more detailed and complete material at one time. (Usman et al., 2015). Therefore, Augmented Reality or AR technology is appropriate for this material. The Biodiversity course is part of the biology material listed in the curriculum for the Science Education Department, Teaching and

Education Faculty (FKIP) of Sultan Ageng Tirtayasa University, which analyzes various levels of biodiversity in Indonesia and its threats and conservation.

Indonesia is a country that has high biodiversity. This biodiversity is spread throughout Indonesia. Indonesia is in the tropics which is also one of the reasons why Indonesia is a nation rich in biological natural resources. From the various biological natural resources, there are various kinds of animals or animals. Of the various kinds of animals, some of them are endemic to Indonesia. Endemic animals are types of animals that are unique and have distinctive characteristics due to adaptation to their habitat (Hawari & Putra, 2022).

Endemic and rare animals in Indonesia are decreasing day by day. This is due to greed and human actions that destroy ecosystems and animal habitats for personal gain and to expand existing residential areas. Endemic and rare animals are often hunted for decoration, pets and their skins are used to become works of art with high value. These are some of the factors that have led to the decreasing number of endemic and rare animals in Indonesia (Karundeng, Mamahit & Sugiarso, 2018). In an effort to protect and preserve endemic and rare animals in Indonesia, the government and society should work together to protect these animals. However, lack of concern is a serious problem in this matter. Adequate knowledge and difficulties in obtaining information are one of the contributing factors (Hawari & Putra, 2022). In this era, the dissemination of information through books or other written media is still not enough to increase people's curiosity (Saputra, 2014). Thus a technology is needed that is able to provide information easily and can visually display 3D forms of endangered species (Hawari & Putra, 2022).

Banten itself as a province in Indonesia also has several endemic flora and fauna that only exist in Banten. Rare flora and fauna is the term given to plants and animals whose existence is threatened with extinction. This scarcity is caused by greed and human actions that destroy ecosystems and animal habitats for personal gain and to expand existing residential areas. Rare animals are often killed to be used as decoration, pets are also used for their skin to become works of art of high value (Karundeng, Mamahit & Sugiarso, 2018). Adequate knowledge and difficulties in obtaining information are one of the contributing factors. Thus, we need a technology that is able to provide information easily and can display 3-dimensional shapes of endangered species visually (Franz, Lestari & Andayati, 2014). In this case, researchers wish to introduce protected flora and fauna in Banten through Augmented Reality technology.

A scientific attitude is an attitude that students must have when carrying out science learning activities or during practicum (Martiningsih, Situmorang & Hastuti, 2018). The dimensions of the scientific attitude used are curiosity, respect for data, critical thinking, discovery, open-mindedness and cooperation, persistence and sensitivity to the surrounding environment. The indicators used in the dimension of curiosity are attention to the observed object, enthusiasm for answers and enthusiasm for the science process. The dimension of respect for the data used is an objective/honest indicator and does not manipulate data. On the dimension of critical thinking, using indicators, consider the findings of friends and do not ignore the data, even though it is small. The attitude dimension of finding indicators used is using facts as a basis for conclusions and analyzing opinions in response to facts. The dimensions of open-mindedness and cooperation use indicators, namely active participation in

groups, respecting the opinions/findings of others and accepting suggestions from friends. The attitude dimension of persistence uses the indicator of repeating the experiment even though it results in failure and completing the job to completion. The sensitive dimension to the environment uses indicators of attention to surrounding events and maintaining the cleanliness of the surrounding environment (Anwar, 2009).

Based on the background that has been described, the problem of this research is how is the scientific attitude of students on the theme of Protected Flora and Fauna in Banten in Augmented Reality-Based Biodiversity Learning? The purpose of this research is to describe the scientific attitude on the theme of Protected Flora and Fauna in Banten in Augmented Reality-Based Biodiversity Learning.

Method

This research takes place from March to May 2023 in the even semester. The location of this research was carried out in the Department of Natural Sciences Education, FKIP, Sultan Ageng Tirtayasa University. The data collection technique used in this research is non-test. Non-test techniques use questionnaires and observation sheets. The questionnaire used in this study was a questionnaire to determine the scientific attitude of students in the learning process of the Biodiversity course with the theme of Protected Flora and Fauna in Banten in Augmented Reality Based. The scale used to measure students' scientific attitudes is the Likert scale. The questionnaire form used is a checklist form. This questionnaire was given after the implementation of the learning process with a total of 30 statements given at the end of the learning process. Observation aims to observe students' scientific attitudes, and observe the learning process using ongoing integration. The observation sheet used to observe students' scientific attitudes during the learning process takes place using a rating scale with a scale (3-2-1) with a total of 18 observed aspects. This observation sheet is arranged in a special format with aspects developed from scientific attitude indicators.

The observation sheet used in this study aims to observe the scientific attitude of students and the implementation of the learning process with Connected type integration during the learning process. The observation sheet is used to make it easier for observers to assess aspects of students' scientific attitudes and as material for consideration of scientific attitude questionnaires filled out by students. The dimensions of scientific attitude observation sheets in discussion activities are used as many as 5 dimensions of scientific attitude with 10 indicators of scientific attitude, the assessment uses a rating scale with 3 scale (3-2-1) with the implementation of the research involving 3 observers. The instruments used in this study have been tested beforehand to obtain valid and reliable data through validity and reliability tests. The scientific attitude observation sheet is made based on the aspects that we want to know in the scientific attitude of students (Permana et al., 2022). Analysis of the scientific attitude observation sheet was carried out using Microsoft Excel, by finding the average percentage value for each indicator and scientific attitude dimension. To determine the criteria for the scientific attitude of students, it can be seen in Table 1. According to Isnaeni, Sujatmiko, and Pujiasih (2021), Android-based media in Androwebic and E-Bokartumban are essential for fostering attitudes toward science, the environment, and critical thinking. Isnaeni, Sujatmiko, and Pujiasih (2021) used the observation sheet instrument to measure the student's scientific attitude towards Android-based media in Androwebic and E-Bokartumban.

Table 1. Criteria for the Value of Student Scientific Attitudes*

Score in Percentage (%)	Criteria
86%-100%	Very good
71%-85%	Good
56%-70%	Adequate
≤55	Deficient

*Kemendikbud, 2015

Results and Discussion

Research on students' scientific attitudes towards Protected Flora and Fauna in Banten in Augmented Reality-Based Biodiversity Learning was carried out with 61 students majoring in Science Education, Teaching and Education Faculty, Sultan Ageng Tirtayasa University, in the even semester of 2022/2023. Students follow the learning process using the Connected type integration model. Connected type integration learning in this study focuses on Biological studies. Augmented Reality-based biodiversity learning is carried out using Connected integration in two meetings.

According to Billyardi et al (2019), Augmented Reality combines digital content created with information techniques and computer programming. The application of AR encourages students to be interactive, so that they can represent all student learning styles, both dominant in visual and audio, because it can integrate all aspects of cognition needed by students (Kamarainen, 2016). Matuk (2016) suggests that the advantages of AR are the appearance of attractive images that make it easier for educators to direct attention and increase student motivation when learning activities take place. The students that engaged in AR learning reported being inspired and content while studying kinematics (Haryadi & Pujiastuti, 2023). Good learning media is media that can provide feedback and become a tool to support student learning achievement. This is in line with research conducted by Quail (2016) which stated that there was an increase in the results of students' biodiversity literacy skills being able to communicate and apply concepts, as well as the confidence to provide problem solving after using AR-assisted VFT learning with increased motivation and students' generic abilities in reconstructing knowledge after making observations.

Biodiversity material has an essential role in understanding the similarities and differences of every living thing where concepts are developed and applied in it such as distribution patterns, differences in gene, species and ecosystem diversity as well as studying Indonesian biodiversity which includes the distribution of flora and fauna, extinction of flora and fauna and their conservation efforts (Usman, 2020). According to (Yani, 2018) learning that is complex in nature needs to be explained with the help of methods and media that are suitable for the characteristics of a very wide range of biodiversity materials including literacy understanding of the extinction of flora and fauna in Indonesia based on the IUCN Red list of Threatened Species index or status. it contains a list of endangered species.

Yli-Panula, Jeronen, Lemmetty, and Pauna (2018) explain the importance of biodiversity as a support for fulfilling all the most basic human needs. All of important human needs are provided by biodiversity in the form of food and health needs, medicines, as well as various services needed to support ecological functions, such as flood control, climate

regulation, nutrient cycles, maintenance of the hydrological cycle, water and clean water, soil formation, pollination and pest control, carbon sequestration and storage, and so on. All of these are related to cultural, social, aesthetic and ethical values, as well as emotional and recreational experiences. Permana et al., (2022) stated that In particular for pre-service science teachers who are not only experts in science and technology but also love and want to preserve Indonesian plants that are starting to become rare, the research findings from the game find me save me receive proper validation and can be used in learning.

Based on Table 2, it shows that the scientific attitude statement points of students with a total of 33 are included in the valid criteria. Based on the results of the consideration of each indicator from each dimension of scientific attitude, 24 valid statements were used from each indicator and with consideration of the distribution of scientific attitude indicators it was decided to use 8 invalid statement items by revising in terms of language so that the total number of attitude questionnaire statements Scientific statements used amounted to 30 items. Based on Table 2, it shows that the results of calculating the reliability of the entire item of the scientific attitude questionnaire statement used have high reliability criteria with a Cronbach's Alpha reliability value of 0.910, so the scientific attitude questionnaire used is reliable.

Table 2. Student Scientific Attitude Questionnaire Reliability Test Results

Reliability of *Cronbach's Alpha*	**Criteria**
0,910	Very high

Table 3. Instrument for Assessing Scientific Attitudes

No	**Indicator**	**Student Code**											
		1			**2**			**3**			**4**		
		3	2	1	3	2	1	3	2	1	3	2	1
1	Curiosity												
2	Respect for data/facts												
3	Open thinking and Collaboration												
4	Perseverance												
5	Sensitive to the surrounding environment												

The results of the research in the form of students' scientific attitudes were obtained by using a questionnaire instrument and scientific attitude observation sheets as a tool for collecting data. The scientific attitude observation sheet is used in observing student activities during discussions. The observer observes the scientific attitudes of students through observation sheets on the integrated learning process of the Connected type on the theme of Protected Flora and Fauna in Banten, then the final score of scientific attitudes is calculated on average at each meeting through statistical tests so that it can be seen that the achievement of scientific attitude values of students is explained in Figure 1, Figure 2 and Figure 3.

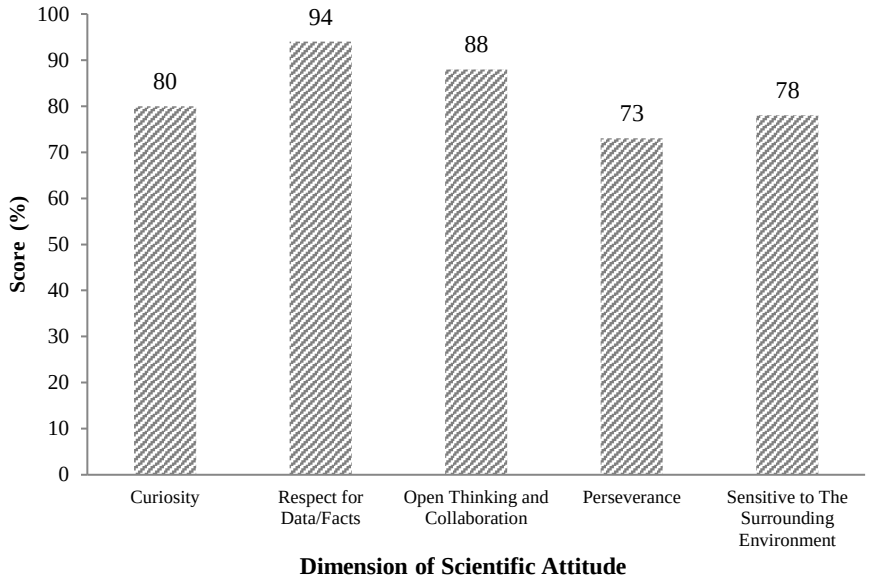

Figure 1. Achievement of the Scientific Attitude Dimension Category Based on the Discussion Activity Observation Sheet

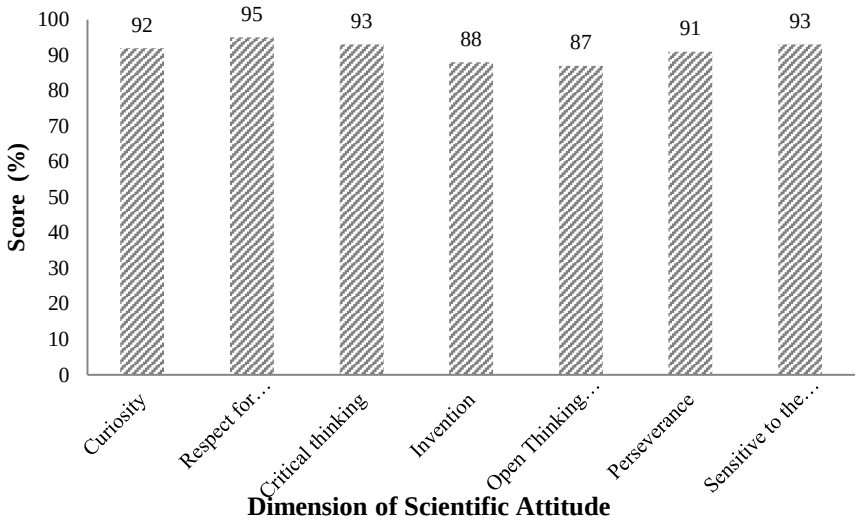

Figure 2. Achievement of Classroom Scientific Attitude Dimension Categories Based on Practicum Activity Observation Sheets

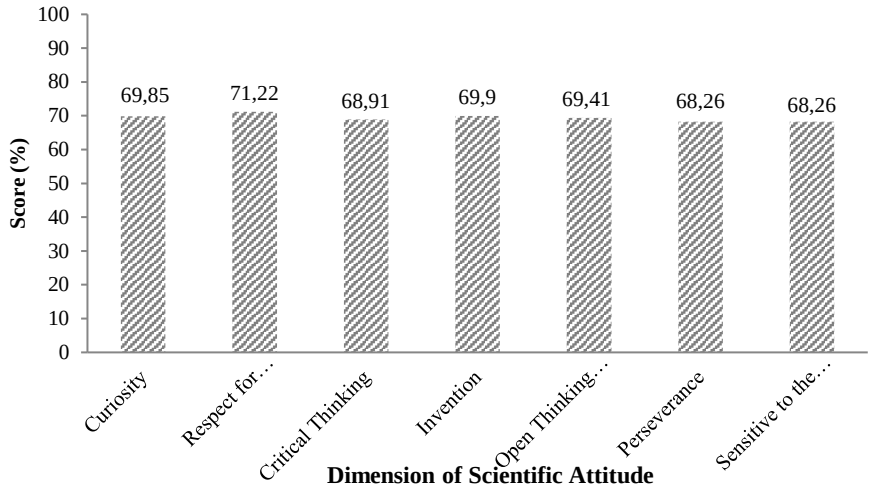

Figure 3. Achievement Category Dimensions of Scientific Attitude Based on Student Questionnaire

The achievement of a scientific attitude through an integrated learning process of the Connected type in discussion and practicum activities is explained in Figure 1 and Figure 2, while the achievement of a scientific attitude based on a questionnaire is shown in Figure 3. The three pictures show that the learning process uses the integrated Connected type on the theme of Flora and Fauna protected in Banten can bring out the scientific attitude of students. Scientific attitudes that are observed and emerge during the learning process include the dimensions of curiosity, respect for data/facts, critical thinking, open-mindedness and cooperation, persistence and sensitivity to the surrounding environment. From the three pictures it can be seen that the greatest scientific attitude possessed by students is in the dimension of attitude of respect for data/facts. In discussion activities, the dimension of respect for data or facts obtained an average value of 94% in the very good category. In practicum activities, the average score obtained was 95% in the very good category, while the scientific attitude obtained by the students based on the questionnaire was 71.22% in the good category. The lowest scientific attitude possessed by students is in the persistence dimension, namely 73% (discussion) in the good category, 68.26% (questionnaire) in the sufficient category, in the open and cooperative dimension (practicum), namely 87% in the very good and sensitive category. on the environment (questionnaire) that is 68.26% in the sufficient category. Previous research was conducted by Huda et al (2013), explaining that using the Connected type of integrated learning can improve student performance in the affective aspect with a very good category, and students give a positive response to the learning process. Widiadnya, Sadia and Suastra (2014) explained that there are significant differences in scientific attitudes between students who learn using the discovery learning model and students who learn using the direct teaching model.

The advantages of the Connected type of integration according to Fogarty (1991) are that with the relationship between ideas in one subject, students will get a clearer and broader picture as is the case with a subject that focuses on one aspect. In addition, students are given the opportunity to develop scientific method or observation skills, students are given the

opportunity to carry out in-depth reviews, improve and assimilate ideas gradually. The advantages obtained by the integration of the Connected type are also explained by Rusman (2015), namely that there is a relationship between ideas in one subject, students can get a clearer, comprehensive and broad picture of the concepts explained and students are given the opportunity to deepen, review, refine and assimilate ideas gradually.

Figure 4. The Augmented Reality of Badak Jawa

The acquisition of a scientific attitude in the good and very good categories is the result of the learning process that has been carried out for two meetings with an average percentage of 100% implementation of the learning process with the criteria of all activities carried out, while student activities obtained an average percentage of 98.25 % with the criteria of all activities carried out. At the first meeting, students were given learning activities on the theme of Protected Flora and Fauna in Banten using the integration of the Connected type with the Problem Based Learning model and the discussion method. At the first meeting, students were introduced to the theme of Protected Flora and Fauna in Banten by linking the concept of pressure to the mechanism of urine formation, providing motivation, asking questions to students to find out concepts that were already known and conveying learning objectives. Enthusiastic students pay attention to the learning process at an early stage, this is indicated by an attitude of curiosity about the relationship between protected flora and fauna in Banten.

Figure 5. The Augmented Reality of Kokoleceran

The core activity of learning at the first meeting is that students are given lessons by showing protected flora in Banten through Augmented Reality media towards the scientific attitudes of science teacher prospective students. Students enthusiastically pay attention to the Augmented Reality that is displayed, at this stage the attitude of curiosity and enthusiasm of students appears based on the observations of each observer. After finishing seeing Augmented Reality, students were asked to discuss completing worksheets with their groups. Students actively discuss, share tasks and look for answers to questions on LKPD. Students also actively present the results of their discussions and ask each other questions or answers. The learning process ends with an explanation from the lecturer in the form of strengthening material in the learning process and ends with conclusions and giving evaluation questions about the learning process with the theme Protected Flora and Fauna in Banten. Based on the research of Yunita et al (2017), learning that is assisted by audio-visual media such as video or Augmented Reality can attract more students' interest and attention so that students are more enthusiastic and active in participating in learning, besides that students do not only receive material from the teacher directly centralized but students are always active in asking questions, daring to express opinions, actively discussing and presenting their work so that students' activities in participating in class learning are more active. Active learning is able to foster students' scientific attitudes. According to Nisa (2017) that learning activities using the practicum method can make students more active, motivated and more enthusiastic in learning, so that it can trigger the formation of an attitude of curiosity in students.

According to Ali (2018) scientific attitudes are complex values and norms that are considered binding on scientists. These norms are expressed in the form of prescriptions, prohibitions, choices/rights, and permits. Another opinion about the scientific attitude according to Fiandi (2015) is the attitude that is inherent in a person after studying science which includes curiosity, respect for data/facts (objectivity), skepticism, verification and critical thinking, open thinking and cooperation, a positive attitude in failure and persistence. Meanwhile Anwar (2009) explains that a scientific attitude is an attitude that must exist in a scientist or academic when dealing with scientific problems. Based on the opinion of these experts, scientific attitude can be interpreted as an attitude that must be possessed by a student when studying or after learning about natural sciences or science.

Based on the results of the observation sheet, the scientific attitude score in practicum activities was higher than the scientific attitude during discussions on the theme of Protected Flora and Fauna in Banten. This is in line with Sukaesih (2014), that practicum-based learning can develop a scientific attitude on the topic of Protected Flora and Fauna in Banten in the Biodiversity course. Through learning using practicum methods, it can require students to be directly involved in scientific activities, so that social interactions that occur within groups or outside groups in learning can influence the formation of scientific attitudes. Ulfa (2016) explained that learning using the practicum method can be used as an alternative in learning Biology to develop students' scientific attitudes. Through practicum activities students fully play an active role in learning, learning can be more meaningful so that students can easily remember the subject matter. Students will be accustomed and trained to be critical, open, objective and always want to try to prove and even be able to compile new theories.

Based on Supiawati et al (2018), the average scientific attitude that uses the guided inquiry-based practicum method is complemented by the discussion method, and the

presentation of the results will increase an open-minded attitude in accepting opinions from students. According to Hendracipta (2016), at the discussion stage the teacher can also ask questions that encourage students to draw conclusions so that the scientific attitude that can be instilled is an open-minded attitude, meaning that they are willing to accept other people's views or ideas, even if these ideas conflict with their own findings. If someone else's idea has enough data to support that idea, then the scientist has no qualms about rejecting his own findings.

Through discussion activities, students are able to have an attitude of respect for data/facts, think openly, be diligent and be sensitive to the surrounding environment. Students complete the LKPD and then present the results of the discussion properly and honestly based on the observer's observations using the observation sheet. In line with Azmi et al (2016), that the learning process carried out using the discussion method can improve scientific attitudes and learning outcomes of students, indicators of scientific attitude also have a major influence on learning outcomes such as being enthusiastic in finding answers, not manipulating data, respecting the opinions of friends and working together in groups in the learning process can provide training and habituation to solve problems in LKPD properly.

The assignment process is given to students to bring up an attitude of perseverance, curiosity, and cooperation. In line with Laksmi et al (2013), the scientific attitude of the dimension of persistence can be instilled through practicum activities and work on worksheets. To complete LKPD it takes perseverance, thoroughness and not easily give up, if you can't answer a problem, students can ask the teacher or peers.

At the second meeting, the learning process was not conducive. Students have not optimally done the task of making media props that show the relationship between protected flora and fauna in Banten, even though the time allotted to complete the task is sufficient. There was only one group that was able to complete the teaching aids, so that the teaching aids which should have been used as learning media for each group became the teaching aids demonstrated by the lecturer. This affects the scientific attitude of students, students who have low scientific attitudes in the learning process tend to be more passive, lack creativity in class, lack enthusiasm in group work, are not innovative, always wait for orders, and only accept what is material presented by Teacher. The condition of students who do not construct the potential that exists in them, if given responsibility for finding problems and obtaining solutions, tends to be less successful (Putri et al, 2015).

Due to the presentation of Augmented Reality which requires a large and stable internet connection, students have a little difficulty answering the questions contained in the LKPD. Most of the students asked the lecturer to get answers on the LKPD. Teaching aids are learning media that can make it easier for students to understand the integration of material between pressure and lung organs. Based on the opinion of Aisyah et al (2018), that the use of visual aids in the learning process makes students more enthusiastic about participating in the learning process. Optimizing the use of media can make students aware of the relationship between learning material and the environment, so that students more easily understand the lessons given even though they are abstract. Eliyawati et al., (2022) stated that the use of the Android application "ChemFUN" is ready to be used in learning activities to study students' understanding of chemistry learning on material topics. Ainyn and Dwiningsih (2022) explained that interactive multimedia by stimulating visual-spatial intelligence is effective for increasing learning outcomes. This media helps teachers and students in identifying objects

directly within limited time if they are going to do it observations that require discovery in places constrained by access and other resources. The results of this technology are expected to help users to interact with the environment in an efficient way virtual (Harrington, 2021).

Based on the explanation of Yunus et al (2016), integrated science learning with the Connected model is a system of instruction that enables students to actively seek for, investigate, and discover scientific topics and principles in a comprehensive, significant, and authentic manner both individually and in groups. It is said to be meaningful because in Connected type integrated teaching, students will understand the ideas they learn directly observation and relate them to other concepts they understand. It is from this meaningful learning process that in turn has an impact on increasing student learning motivation which in turn improves student learning outcomes including students' scientific attitudes. Another opinion was also explained by Yunus et al (2016), learning by using the Connected type of integration which can connect one topic to another makes students enthusiastic about finding out the relationships presented in the problems and questions on Protected Flora and Fauna Worksheets in Banten. The existence of presenting problems in the learning process stimulates students to be curious so that students are motivated to continue learning and want to continue to find out to get answers to questions or curiosity.

The integrated learning model of the Connected type is a learning-oriented model that can relate a subject to other sub-subjects, one concept to another, link one skill to another, so that learning will not be separated. Thus, students are trained to be able to discover for themselves various concepts that are studied holistically, meaningfully, authentically, and actively. The integrated learning model of the Connected type adheres to constructivism which states that knowledge is formed by individuals and experience is the main key to meaningful learning. This can be seen from students who are directed to think broadly and deeply to understand the conceptual relationships presented by the teacher. Furthermore, students will get used to thinking directed, orderly, whole, comprehensive and systematic (Suriyani et al, 2017). With this pattern of thinking, students are also trained to have a scientific attitude, especially in the dimensions of critical thinking and curiosity.

This was also explained by Istikomah et al (2010), one of the functions and objectives of the Science subject is that students can gain experience in applying the scientific method through trials and experiments so that they are trained to be scientific. According to Hayat et al (2011) explained that changes in one's scientific attitude after learning are not static but can experience changes after the learning process. To change scientific attitudes through learning according to Astuti et al (2016) is a difficult thing, because attitude is a habit and takes longer to get good improvements.

Conclusion

Based on the results of the research that has been done, it can be concluded that the scientific attitude of students towards Protected Flora and Fauna in Banten in Augmented Reality-based Biodiversity learning obtains an average score of 86.88% in the good category. While the scientific attitude based on the questionnaire obtained an average value of 78.88% in the good category. The highest scientific attitude dimension possessed by students is the dimension of respect for data or facts, while the lowest scientific attitude possessed by students is the attitude of perseverance.

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