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Application of the Environmental Exploration Approach (JAS) Assisted by QR Codes to Increase Scientific Literacy Aspects of Competency and Conservation Attitudes in Plantae Material

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ABSTRACT

The purpose of this study was to describe student learning activities, to analyze the differences in increasing scientific literacy in the aspect of student competency and to analyze the increase in conservation attitudes of class X students in plantae material which was taught using the Natural Surroundings (JAS) approach assisted by the QR Code. This research is a quantitative study with a sample of 31 students of class X MIPA 1 control class and 32 students of class X MIPA 3 experimental class. The research design used was the pretest posttest control group model. Data collection techniques in this study used observation, tests and questionnaires. The results showed that there was an increase in student learning activities at each meeting. There is a significant difference in increasing scientific literacy in the competency aspect in indicator 2 with a significance value of 0.000. And there is an increase in conservation attitudes after the learning treatment. Based on the results of the study it can be concluded that the application of learning using the Natural Surrounding Exploration (JAS) approach assisted by the QR Code can increase student learning activities, scientific literacy aspects of competence and students' conservation attitudes towards biology learning.

Penerapan Pendekatan Jelajah Alam Sekitar (JAS) Berbantuan QR Code Untuk Meningkatkan Literasi Sains Aspek Kompetensi Dan Sikap Konservasi Pada Materi Plantae

ABSTRAK: *Tujuan dalam penelitian ini yaitu untuk mendeskripsikan aktivitas belajar siswa, untuk menganalisis perbedaan peningkatan literasi sains aspek kompetensi siswa dan untuk menganalisis peningkatan sikap konservasi siswa kelas X pada materi plantae yang diajarkan dengan pendekatan Jelajah Alam Sekitar (JAS) berbantuan QR Code. Penelitian ini merupakan penelitian kuantitatif dengan sampel sebanyak 31 siswa kelas X MIPA 1 kelas kontrol dan 32 siswa kelas X MIPA 3 kelas eksperimen. Desain penelitian yang digunakan yaitu model pretest posttest control group. Teknik pengumpulan data dalam penelitian ini menggunakan observasi, tes dan angket. Hasil penelitian menunjukkan bahwa terdapat peningkatan aktivitas belajar siswa pada setiap pertemuan. Terdapat perbedaan peningkatan literasi sains aspek kompetensi yang signifikan pada indikator 2 dengan nilai signifikansi 0,000. Dan terdapat peningkatan sikap konservasi setelah perlakuan pembelajaran. Berdasarkan hasil penelitian dapat disimpulkan bahwa penerapan pembelajaran dengan menggunakan pendekatan Jelajah Alam Sekitar (JAS) berbantuan QR Code dapat meningkatkan aktivitas belajar siswa, literasi sains aspek kompetensi dan sikap konservasi siswa terhadap pembelajaran biologi.*

INTRODUCTION

Education is currently in the 21st century and is also known as the era of industrial revolution 4.0 which is characterized by the rapid development of science and technology (Nukhbatul Bidayati Haka et al., 2020). Some of the challenges currently needed, one of which is digital-based learning. Challenges of 21st century learning: educators are expected to have the competence to produce learning media that is appropriate to conditions and circumstances (Ismiati, 2020);(Syara et al., 2020). The skills that students must have in the 21st century are literacy skills. Students really need to have literacy skills, so they can have a broad mindset and outlook (Aisyah et al., 2021).

Scientific literacy is the ability to be interested in scientific topics and scientific ideas so that you can explain a phenomenon scientifically by evaluating and designing scientific methods, as well as interpreting data and evidence scientifically (OECD, 2019). Scientific literacy is very important for students to be able to communicate and relate various scientific topics, with their applications in everyday life and to be able to solve problems in their environment (Chairunnisa et al., 2021). The existence of scientific literacy, which is possessed by students, can train their understanding of social, political, economic and health issues (Mellyzar et al., 2022). This is in accordance with research by Yolida et al. (2022) that the implementation of students' scientific literacy starts from sensitivity and awareness in solving problems in the context of everyday science, both individual and classical.

Science literacy has four aspects. In this study using two aspects which when connected with the natural environment will be interrelated. Aspect of the first competence is the ability to explain phenomena in this case regarding plantae material. The indicators reviewed are explaining phenomena scientifically and interpreting data and evidence scientifically to make conclusions and communicate, identify assumptions and evidence that support conclusions and explain the social implications of science (Aisyah et al., 2021). A second aspect of attitude is an interest in science and then a moral message contained in the issue. In this study, the attitude that will be shown is a conservation attitude where students can foster a sense of love and care for the natural environment by conducting scientific investigations. Therefore, the aspect of conservation competence and attitude is a very important unity and there is scientific literacy (Adnan et al., 2021).

PISA groups these competency dimensions into 3 main aspects, namely explaining phenomena scientifically (explain phenomena scientifically), evaluating and making scientific investigations (evaluate and design scientific inquiry), and interpreting data and showing facts scientifically (interpret data and evidence scientifically) (OECD, 2019). Based on TIMSS data for 2015, Indonesia obtained a score of 397 and was ranked 45th out of 50 countries in the field of mathematics and ranked 45th in the field of science (Salsabella & Juanengsih, 2021). This has proven that the scientific literacy of Indonesian students is still low. The lack of availability of learning tools developed by teachers is one of the factors that contributes to low literacy in Indonesia (Listianingsih et al., 2021). The low ability of Indonesian students' scientific literacy is generally caused by learning activities that are not oriented towards developing scientific literacy. Schmidt et al. (2020) also revealed that the low ability of Indonesian students' scientific literacy is influenced by the curriculum and education system, the choice of teaching methods and models by teachers, learning facilities and facilities, and teaching materials.

The application of literacy skills in biology learning can be carried out through specific learning approaches so that students' skills continue to develop. One learning approach that supports this

situation is learning through the Environmental Exploration Approach (JAS) (Yuniastuti, 2013:31-32). The Environmental Exploration Approach (JAS) has been a learning strategy since 2005 (Ridlo, et al 2012:1). The natural exploration approach (JAS) is a learning approach which in its activities utilizes objects, especially the surrounding environment, directly through observation, discussion and results reports (Winarni, 2013: 145). The JAS approach does not require students to memorize information, but encourages students to develop the knowledge information obtained based on biological concepts through a process of exploration and investigation in the environment around them.

The results of observations at MAN 1 Majalengka in biology learning have varied starting from lectures, practicums and discussions. However, learning biology has not raised the local environment for learning. Learning by elevating local potential can foster understanding that will be used in everyday life (Atilla, 2012). One of them is using the JAS approach which uses the surrounding environment as a learning resource to foster students' environmental caring attitudes.

Environmental conditions today are still neglected from the attention of the academic world, including schools. Schools have not been able to transmit environmentally charged knowledge so that students do not yet have ecological intelligence or ecological literacy (Wulandari & Djukri, 2022). On the other hand, educators also do not utilize the environment as a source and learning media (Haka et al., 2021). Problems regarding the environment are mostly still only given to the cognitive realm, so it is not surprising that what happens is that knowledge about the environment is memorized, dwelling on definitions from student handbooks, until student evaluation sheets rarely measure the affective and psychomotor aspects related to it. environmental problems (Istiana et al., 2020). This description is one of the problems in learning biology.

The current environmental problems are the result of human ignorance in managing natural resources properly. Excessive exploitation of natural resources goes hand in hand with increasing environmental damage (Huang et al., 2020). The level of environmental damage in Indonesia is in the very worrying category, environmental pollution due to human activities in terms of the industrial and tourism sectors contributes to the largest environmental damage in Indonesia. In addition to high environmental damage, exploitation of flora and fauna is very large in Indonesia (Feng et al., 2020). Many species of flora and fauna are on the IUCN red list (threatened with extinction). All of this happened due to the low environmental awareness of the Indonesian people and the lack of conservation attitudes among the people. Therefore, a program is needed that can foster conservation attitudes among the community, especially the younger generation, namely students (Fagundes et al., 2021). One solution that can be offered is the research school program which is a conservation and environmental awareness education program through learning in nature and counseling at secondary and basic education levels, in order to create an attitude of environmental awareness and conservation attitudes in students (Nurhapipah, et al, 2021).

Learning using the JAS approach can use the environment for outdoor learning, and the environmental impact of care behavior has been carried out by Susilowati et al. (2019). Nature-based learning using the JAS approach is also an effort that can be made by educational institutions to foster conservation-based character education (Ahmed et al., 2020).

The research results show that classes using the JAS approach can foster nature care behavior in the very good category. Apart from that, the implementation of the JAS approach provides an edutainment effect,

namely making learning meaningful and enjoyable. So that learning becomes fun and easy to understand and can be put into practice in everyday life (Wang et al., 2021). Learning activities in the 21st century with digital-based learning challenges to develop students' use of technology, computers and cellphones. This is the basis for developing teaching media that integrates various material text formats with other types of media (video, audio, journal articles and others) called smart books based on QR Codes to access additional material or other media as a stimulus provider. (Garrido-Bigotes et al., 2019)

The results of research discussing the use of QR Codes, received a good response, the use of QR codes can develop knowledge about Botany, students can learn more than new things. At the same time, QR codes increase students' determination to continue to explore knowledge. The use of a QR Code can store information on the characteristics of a particular plant and support learning facilities in recognizing and memorizing plants according to their classification (Balaram, 2019). The use of QR Codes in learning using the Environmental Exploration (JAS) approach has not been carried out in previous research. The use of QR Codes in learning using the JAS approach is expected to increase scientific literacy in aspects of competence and conservation attitudes in plantae material (Meng et al., 2020). The content of the QR Code in this research is different from previous research, because in this QR Code it is made in the form of an infographic which looks more attractive and colorful. Apart from that, the content contained in the QR Code not only displays the classification of plants, but also displays the characteristics and benefits of plants in the surrounding environment. (Ecoffet et al., 2021). Based on the description above, the researchers conducted research on the Application of the QR Code Assisted Natural Exploration Approach (JAS) to Increase Scientific Literacy in Competency Aspects and Conservation Attitudes in Plantae Material.

METHOD

This research was conducted at MAN 1 Majalengka. This study used quantitative research using a pretest posttest control group research design. The research sample was taken through random sampling technique. The research samples used were class X MIPA 3 (x) with 32 students as the experimental class and class X MIPA 1 (y) with 31 students as the control class. The independent variable in this study is through the QR Code-assisted Exploration of the Natural Surroundings (JAS). And the dependent variable in this study is scientific literacy in terms of competence and attitude (conservation). Data collection techniques in this study used observation, tests and questionnaires. For data analysis techniques using the N-Gain test, prerequisite tests consisting of normality tests and homogeneity tests, and hypothesis testing using the independent sample T-test which will be analyzed using ANATES and SPSS.

RESULTS AND DISCUSSION

Based on research conducted, there are 3 aspects of assessment for student learning activities, namely explaining phenomena scientifically, interpreting data and evidence scientifically, and evaluating and designing scientific investigations which can be seen in Figure 1.

Based on research data, the average value of student activity in the experimental class was 47.08 at meeting 1, 79.17 at meeting 2, and 80.42 at meeting 3. Comparison of the average value of experimental class activity per meeting Based on data, it shows that there is an increase in student learning activities at each meeting. So, it can be concluded that the application of the QR Code-assisted natural exploration approach is effective in increasing student learning activities (Akbay et al., 2022). The average value of student learning activities per aspect of assessment

in the experimental class at each meeting can be seen in Figure 2:

Based on the data in Figure 2, it shows that the value per aspect of the assessment at each meeting has increased student learning activity and the assessment aspect 1 has the highest increase compared to the other two assessment aspects. The following student learning activities based on JAS syntax can be observed in Figure 3 below.

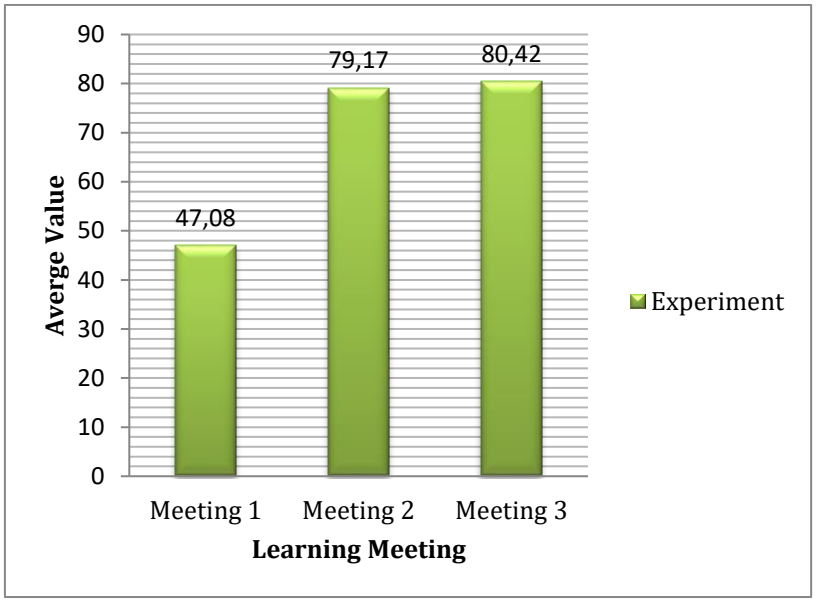

Figure 1. Diagram of the average value of experimental class student learning activities

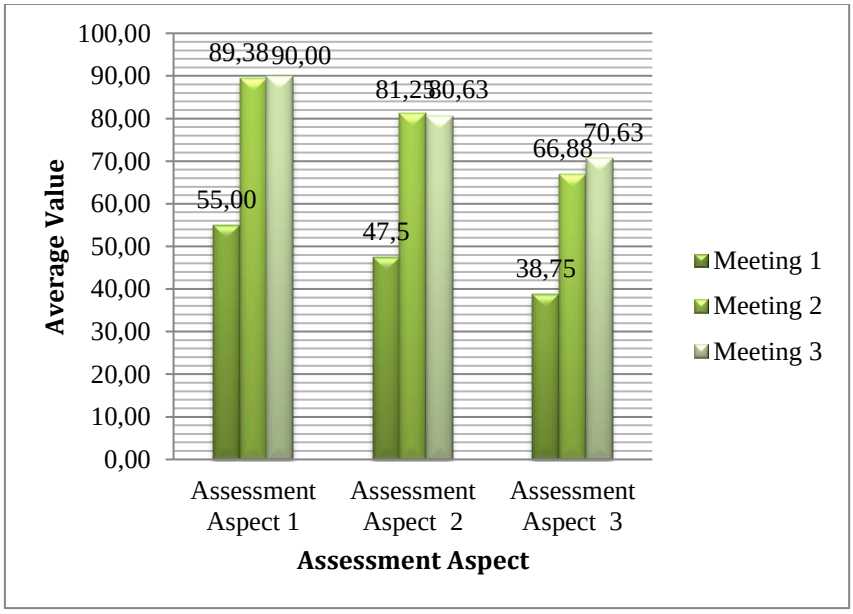

Figure 2. Diagram of the Average Value of Student Learning Activities Per Experimental Class Assessment Aspect

Based on Figure 3, it shows that the results of student learning activities during the learning process show an increase in learning activities in syntax exploration to syntax evaluation. These results show that there is the lowest student learning activity from the syntax carried out, namely at the exploration stage with a total value of 80.21, students who are active in carrying out learning activities. Meanwhile, the highest number is in the evaluation syntax at 90.63. The highest increase in student activity was found in the move from exploratory syntax to interaction, namely with an increase of 5.21.

Student activity in carrying out learning activities from syntax exploration to evaluation continues to increase without any decrease in learning activity with an average activity of 86.25. Based on this, it can be concluded that the application of the QR Code assisted nature exploration approach (JAS) shows the enthusiasm and activeness of students increases in each syntax.

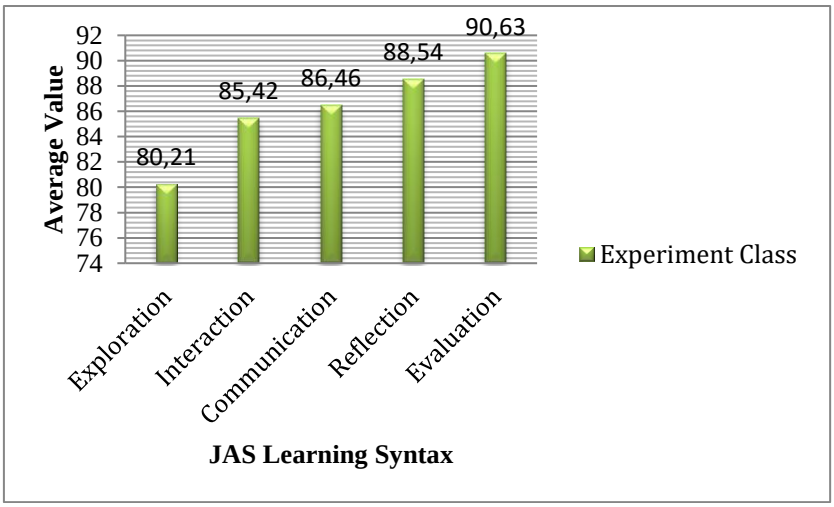

Figure 3. Student Learning Activity Diagram Based on JAS Syntax

(Ijane Guarte Barrientos, 2021) said, The low scientific literacy ability of students can be influenced by several factors, including the curriculum and education system, the selection of learning methods and models, computer facilities as learning support, the use of computer-based media and the frequency of accessing information via the internet. In this study, the authors were helped by having permission at the research site to use smartphones in the school environment, so that all students could access the internet. Scientific literacy is measured using test instruments before and after the learning activities take place, namely in the form of *pretest* and *posttest* based on competency aspects of scientific literacy (Qamariah et al., 2021). The test was carried out in two different classes, namely the experimental class and the control class to find out differences in learning outcomes in classes that used and did not use the QR Code-assisted JAS approach.

Based on the research that has been done, learning outcomes refer to scientific literacy abilities that are tested on the main aspects of the scientific literacy competency dimension. There are three aspects of competence, namely first, explaining phenomena scientifically. Second, interpret data and evidence scientifically. And third, evaluating and designing scientific investigations. The average value and n-gain value of student learning outcomes in the experimental class and in the control class can be seen in Table 1 and Figure 4, which are as follows:

Table 1. Average Student Learning Outcomes and N-Gain Scores

Class	Average		*N-Gain*
	Pretest	***Posttest***	
Experiment	36,63	68,75	0,51
Control	30,84	55,61	0,37

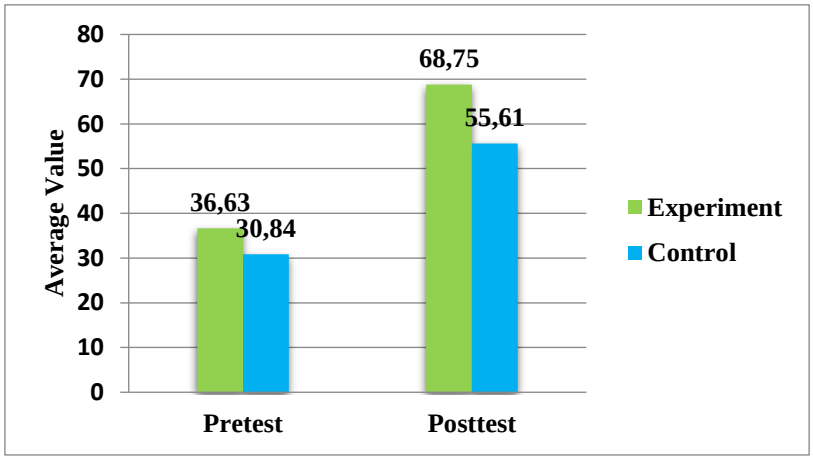

Figure 4. Diagram of the Average Score of Science Literacy Learning Outcomes for Experiment Class and Control Class

Based on Table 1 and Figure 4, the average pretest and posttest scores have both increased. The average value contained in the experimental class has a higher number than the control class. The pretest value is the initial value that students get before being given treatment. The average value of the pretest in the experimental class was 36.63 and in the control class was 30.84. The posttest score is the final score that students get after being given treatment. The average value of the posttest in the experimental class was 68.75 and that of the control class was 55.61. The N-gain value is the difference between the posttest value data minus the pretest value. The N-gain value in the experimental class is 0.51, which is in the medium category, and the control class is 0.37, which is in the medium category. Both class groups have an average N-gain value in the medium category, but the experimental class has a higher value than the control class. This difference greatly determines the analysis of increasing students' scientific literacy before and after learning.

Based on this data, the average pretest and posttest scores between the experimental class and the control class have very different data comparisons, because they are influenced by the application of learning to explore the surrounding nature (JAS) assisted by QR Code in the experimental class. So, it can be concluded that there is an increase in student learning outcomes from the results of the difference between the pretest and posttest with the application of the QR Code-assisted natural exploration approach (JAS) to increase students' scientific literacy. Astuti & Hayati (2019) said the large difference in average scores illustrates that learning using the JAS approach assisted by QR Code has proven to be effective in improving students' learning outcomes and scientific literacy regarding learning material.

The difference in the combined average score between pretest and posttest shows that mastery of plant world (Plantae) material is more mastered by the experimental class, the QR Code-assisted environmental exploration (JAS) approach plays a role in increasing understanding of plant world (Plantae) material based on learning outcomes. have been done. Based on data on the average N-gain value of scientific literacy, it can be concluded that the level of understanding in the material that has been provided has a higher level of scientific literacy in the experimental class compared to the control class, because the average difference between the pretest and posttest scores is greater in the results. experimental class.

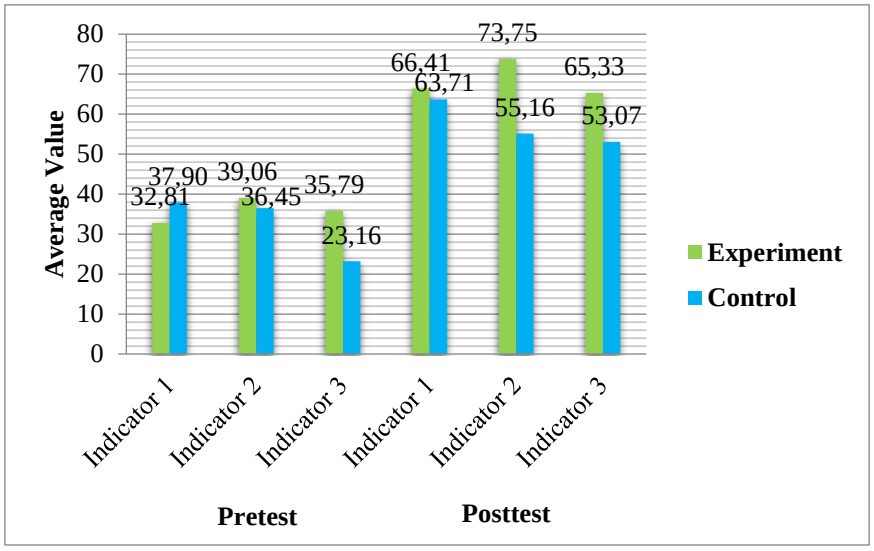

Figure 5. Pretest-Posttest Average Score Diagram for Each Competency Aspect Science Literacy Indicator

The results that can be analyzed based on Figure 5, there are differences in the average pretest and posttest scores between the experimental class and the control class for each indicator. The pretest scores in the experimental class were smaller than the posttest scores on the scale for each indicator of scientific literacy. Observable results from each indicator of scientific literacy, in the experimental class on indicator 2 experienced an increase and decreased the number of average scores on indicator 3. The results in the control class for each indicator of scientific literacy experienced a decrease in the number of average values and the location of the value the lowest is indicator 3, namely "Evaluating and Designing Scientific Investigations" among the other two indicators. The mean value of scientific literacy pretest for all indicators in the experimental class was 35.89 and in the control class was 32.50. The difference in the mean value of the scientific literacy pretest for all indicators for each class is 3.39. The scientific literacy indicator has a difference in increase and decrease from indicator 1 to indicator 3. The difference in pretest scores in the experimental class between the indicators of scientific literacy, namely in indicator 1 and indicator 2, has increased by 6.25. And in indicator 2 and indicator 3 it decreased by 3.27. Whereas in the control class the scientific literacy indicator has a difference in decreasing from indicator 1 to indicator 3. The control class has a difference in the pretest value between indicator 1 and indicator 2 of 1.45. And in indicator 2 and indicator 3 it is 13.29. Based on these data, it can be concluded that the average value of the experimental class has an increase in indicator 2 and in the control class it has decreased to indicator 3 because each indicator is increasingly complex, so that the average value of the control class is lower than the average class value experiment.

The average posttest score for the experimental and control classes showed results that were not much different from the pretest results. The posttest value of the scientific literacy indicator in the experimental class has increased in indicator 2 and decreased in indicator 3. Meanwhile, the posttest value of the scientific literacy indicator in the control class has decreased from indicator 1 to indicator 3. This can be observed in Figure 5. Average value posttest for all indicators for each class, namely the experimental class was 68.50 and the control class was 57.31 with a difference between the two classes of 11.19. In the experimental class, the value of each scientific literacy indicator between indicator 1 and indicator 2 increased by 7.34, while indicators 2 and 3 decreased by 8.42. Meanwhile, in the control class there was a decrease from indicator 1 to indicator 3. The difference value between

indicator 1 and indicator 2 was 8.55 and indicator 2 and indicator 3 was 2.09. The average posttest score between the experimental class was greater when compared to the control class. Lestari et al. (2021) said, this means that the scientific literacy test scores of the experimental class, both pretest and posttest, are higher than the scientific literacy scores of the control class. Based on the posttest data, it can be concluded that the decline in scores on the scientific literacy indicator shows that the level of difficulty in understanding the dimensions of scientific literacy competence is becoming increasingly difficult, so that this decline is common and occurs in the experimental and control classes.

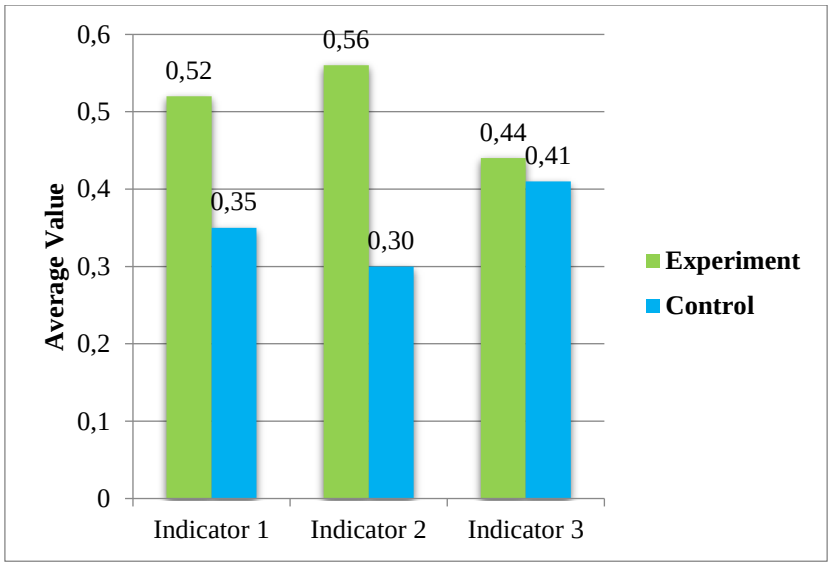

Figure 6. Diagram of the Average N-Gain Value for Each Science Literacy Indicator

The normality of gain for each scientific literacy indicator based on Figure 6 shows that there are differences in the average values that occur in the pretest and posttest results between the experimental class and the control class. The comparison of average values has the same category for each indicator. The scientific literacy indicator in the experimental class has a higher N-Gain value in the entire test, with indicator 1 having an N-Gain value of 0.52 which is in the medium category, indicator 2 is 0.56 which is in the medium category, and indicator 3 is 0.44 which is included in the medium category, and the average N-Gain value for all indicators in the experimental class is 0.51 which is included in the medium category. Based on these data, it can be concluded that the average N-Gain score shows that the results of increasing students' scientific literacy are in the medium category, because the combined pretest and posttest scores for the experimental class have a higher difference in scores compared to the difference in scores for the control class.

Understanding of each indicator of scientific literacy in the control class has a value that is not high enough compared to the experimental class. The N-Gain value obtained for the control class in indicator 1 was 0.35, including the medium category, indicator 2 was 0.30, including the medium category, and indicator 3 was 0.41, including the medium category, and the average N-Gain value for all indicators was 0 .35 which is included in the moderate category. So, based on the comparison of normality gain values, it can be concluded that students' understanding of scientific literacy in plantae (plant world) material in the JAS approach in the experimental class has a higher level compared to the control class, even though both are in the medium category but the experimental class has a high average N-gain

value, because the control class score has a combined pretest and posttest score that is not large compared to the experimental class.

Based on the research that has been carried out in distributing questionnaires and data processing, analysis is then carried out on the overall results of the pretest and posttest scores, achievements per item of conservation attitude statements before treatment (pretest) and after treatment (posttest), achievements of conservation attitude indicators and consulting scores obtained on the conservation attitude category scale (Prasetyo et al., 2021). Table 2. Presents the average pretest and posttest scores for conservation attitudes among experimental class students.

Table 2. The average score of the Experimental Class Conservation Attitude

Class	Average	
	Pretest	***Posttest***
Experiment	83,81	84,34

Based on the data in Table 2, it shows that the average score on conservation attitudes has increased. The average score of students' conservation attitudes in the experimental class was 83.81 in the pretest and 84.34 in the posttest. Calculation of the average score of the conservation attitude has an increase of 0.53. So, it can be concluded that there is an increase in students' conservation attitudes after learning using the QR Code-assisted environmental exploration (JAS) approach. Next, an analysis of the achievements per item of conservation attitudes is carried out which are presented in Table 3.

Table 3. Average Score of Conservation Attitudes Per Experiment Class Item

No.	Statement	Average Score	
		Pretest	***Posttest***
1.	Influence local friends to take responsibility for the surrounding environment	4,88	4,81
2.	Make calls or posters to care for plants or the environment	4,56	4,50
3.	Participate in activities to care for plants	4,53	4,53
4.	Distinguish between disposing of organic and inorganic waste in its proper place	4,59	4,69
5.	Using environmentally friendly places to eat and drink in daily activities is a form of caring for the environment	4,41	4,53
6.	Save on paper usage	3,97	4,03
7.	Planting plants in the environment	4,56	4,53
8.	Maintain soil sustainability by not throwing used detergent on the ground	4,34	4,56
9.	Recycling organic and inorganic waste into works of art is one of the conservation measures	4,31	4,34
10.	The purpose of carrying out conservation efforts is to maintain the sustainability of plants	4,28	4,41
11.	Plants that don't have many uses but only have a small number of populations don't have to be conserved	2,78	3,09
12.	A plant such as the Corpse Flower has tubers which can be a substitute for rice because it has a high source of energy for the body, so its existence needs to be conserved	3,81	3,88
13.	There are several plants that are used as ingredients for traditional rituals, raw materials for making perfumes such as jasmine, roses so that their presence in nature needs to be preserved by not overusing them.	4,22	4,25
14.	Caring for flowers is a reasonable action that can support the preservation of these plants	4,44	4,34
15.	Rare plants that are found in a tourist location must be protected with fences	4,69	4,63

No.	Statement	Average Score	
		Pretest	*Posttest*
	and the like so that they are not damaged by visitors		
16.	Planting typical plants such as hanjuang, croton in the yard is one of the conservation measures	3,88	4,13
17.	Students need to water the plants around the school yard	3,94	3,69
18.	Cleaning up weeds around the school yard is also the responsibility of the students, not just the janitor	3,84	3,84
19.	Planting plants and providing fertilizer to plants in the school environment is the responsibility of students, teachers and school staff	3,56	3,50
20.	Caring for and remodeling plants that have grown a lot so that they grow well	4,22	4,06

Based on Table 3 of the 20 conservation attitude statement items, most of them show an average attitude of agreeing, disagreeing and disagreeing. At the time of the pretest, there were 13 items that agreed and in the posttest, 15 items for the statements asked in the questionnaire. For those who disagreed at the pretest there were 6 items and at the posttest 5 items. Meanwhile, there was only 1 item which stated that they did not agree with the statements asked in the questionnaire. The following Table 4 regarding the attitude of conservation indicators.

Based on Table 4 above, the results show that students at MAN-1 have the best conservation attitudes in the attitude indicator towards environmental protection (indicator 2). The average score in the experimental class on indicator 2, namely the pretest was 92.81 and the posttest was 92.66. The lowest conservation attitude indicators in the experimental class were the goals and principles of conservation biology with an average pretest score of 70.63 and posttest of 75.00. Based on the data in table 4.8, there are 5 indicators in conservation attitudes for each indicator that have increased in average score and 2 indicators that have decreased. So, it can be concluded that there is an increase in students' conservation attitudes after learning using the application of the environmental exploration approach (JAS) assisted by QR Code. A comparison graph of the achievements of each indicator is presented in Figure 7.

Table 4. Average Scores of Experimental Class Indicator Students' Conservation Attitudes

No.	Conservation Attitude Indicators	Average Score	
		Pretest	*Posttest*
1.	Goals and principles of conservation biology	70,63	75,00
2.	Attitude towards environmental protection	92,81	92,66
3.	Environmental preservation attitude	86,41	88,28
4.	Students' attitudes towards environmental use	86,25	86,88
5.	Biodiversity values	80,31	81,25
6.	Plant conservation and restoration actions	86,67	87,29
7.	The habit of maintaining environmental sustainability	77,81	75,47

Based on Figure 7, it shows that the indicators in the experimental class of attitude towards environmental protection have the highest average achievement. While the indicators of goals and principles of conservation biology showed the lowest average. Based on a comparison of the average scores for each conservation attitude indicator, there was an increase in indicator 1, indicator 3, indicator 4, indicator 5 and indicator 6. Meanwhile, the other 2 indicators experienced a decrease. So, it can be concluded that in general the students' conservation attitude has increased

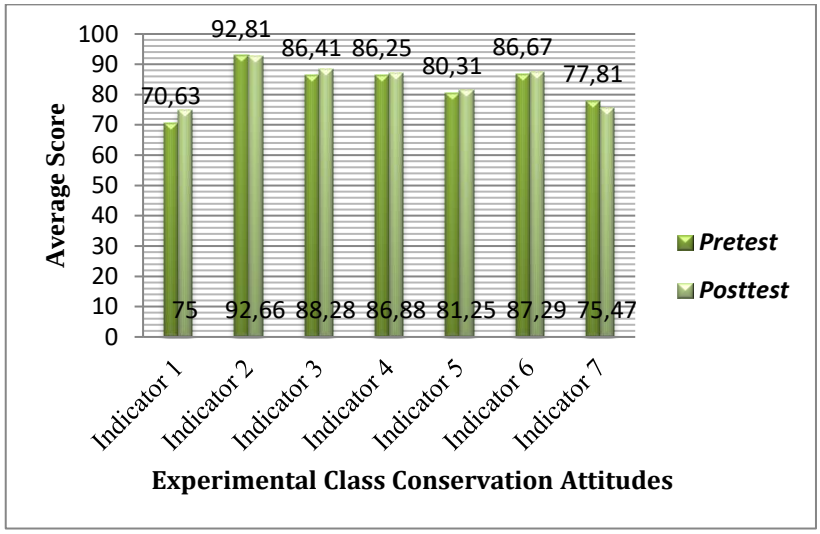

Figure 7. Comparison diagram of the average scores for each conservation attitude indicator for the experimental class

CONCLUSIONS AND SUGGESTIONS

Based on the results of the research that has been carried out, it can be concluded that the application of the QR Code-assisted natural exploration approach (JAS) shows increased student enthusiasm and activeness in each syntax. There is a significant difference between increasing scientific literacy in the competency aspect of students who are taught using the QR Code-assisted environmental exploration (JAS) approach and those who do not use the QR Code-assisted JAS approach to increase the competency aspect of scientific literacy in plant world (Plantae) material. Apart from that, there was an increase in conservation attitudes in the experimental class after learning using the environmental exploration approach (JAS) assisted by QR Codes to improve students' conservation attitudes towards the plant world (Plantae) material.

Based on the research that has been carried out, the suggestions in this research are for teachers, learning using the application of the natural exploration approach (JAS) assisted by QR Codes can be used as an alternative approach and learning model that can support the learning process. Schools should provide facilities and infrastructure that can support or are needed in the learning process so that the learning process can run effectively and optimally. For other researchers, it is hoped that they can conduct research using QR Code-assisted environmental exploration (JAS) which can improve other aspects besides scientific literacy. Apart from that, it is hoped that we can maintain conducive classroom conditions and pay attention to time in the learning process so that it can take place optimally.

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