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Animal Quartet Card Learning Media: How Does It Influence Students' Science Literacy Competence?

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Abstract: Learning media is a very important aspect to help achieve learning goals. This research aims to examine the influence of Animal Quartet media on students' scientific literacy competencies. This research uses quantitative research methods with a one sample pretest and posttest group experimental questionnaire design with a sample size of 30 class X students at Madrasah Aliyah. Quantitative data was obtained from the average learning outcomes of students using the animal science material science literacy test instrument. Quantitative data is processed using descriptive analysis to determine the average, student learning outcomes before and after learning using Animal Quartet. The instrument used was the PISA scientific literacy test instrument with a reliability of 0.724. The research results show that the Animal Quartet Card learning media obtained an N-gain score of 0.89 which is in the high category. Then the N-gain percentage results were obtained at 89.86% which shows the effective category. So it can be concluded that after implementing the Animal Quartet Card learning media, there was a significant and effective difference in increasing students' scientific literacy competency.

Keywords: Animal Quartet, Scientific Literacy, Learning Media.

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INTRODUCTION

Education in Indonesia is experiencing complex problems. The Ministry of Education and Culture revealed the results of a study by the international Program for International Student Assessment (PISA) which released the results of its research measuring students' reading, mathematics and science literacy achievements. Indonesia is still consistently one of the countries with very low PISA scores for the last 10 years, especially in the field of scientific literacy competency. In 2018, the science competency of students in Indonesia was still ranked 70th out of 78 countries, 60% of students had science competency in the minimum category, 41% of students experienced unpleasant behavior every month and only 29% of students had a mindset and belief. themselves to develop by considering education as important (Helwig, Hong, and Hsiao-wecksler, 2021). This fact is an indicator that education in Indonesia must continue to strive to increase students' scientific literacy competencies. The scientific literacy competency expected of students is being able to use understanding and information technology intelligently, not only understanding

theoretical concepts but being able to apply them to solve problems, make decisions, think critically and creatively and the ability to collaborate. Scientific Literacy is an approach to the science learning process consistently and comprehensively in schools to support the development of Scientific Literacy for each student. (Marchetti and Valente, 2015; Gormally, Brickman, and Lut, 2012) scientific literacy is the ability to understand scientific processes and engage meaningfully with scientific information available in everyday life.

One effort to grow students' scientific competence is to provide opportunities for teachers to develop themselves to be more creative and innovative in creating an inspiring, meaningful and enjoyable learning atmosphere, thereby eroding the conventional learning model that is dominantly carried out by teachers so that students are less actively involved in learning. (Lubis, 2019; Lubis et al., 2021). The results of research conducted by (Rahmadani, Harahap & Gultom 2017) show that students' low interest in learning is caused by several external factors, namely teacher teaching strategies 37%, the presence of laboratories 49% and reading materials 45%. The results of empirical observations carried out by researchers at Madrasah Aliyah Negeri 3 Makassar, especially the animalia material in biology subjects, are that students still find this lesson boring because of the many Latin names and about animals that are difficult for students to observe directly, such as animals that live in land or water. As a result, students are only smart at memorizing concepts, and only learn when there are exams or rote assignments. Students are unable to develop the meaningfulness of their knowledge in solving biological problems in the surrounding environment. Students' low interest in Animalia material has an impact on the average student's scientific literacy competency score only reaching a completion score of 45%. As a result, many students feel bored and learning becomes less meaningful. Students only understand theory but are unable to utilize their knowledge.

Teachers must be creative in creating a learning atmosphere that inspires students to always learn with full awareness to improve scientific literacy skills which is the main goal of science learning (Dasopang et al., 2023; Lubis & Wangid, 2019; Silvia et al., 2023). Through scientific literacy, students can ask questions, discover and make decisions that are developed from their curiosity related to their meaningful daily life experiences. Creativity that can be carried out by teachers is the use of learning media that suits students' learning styles which can involve them auditively, visually and kinetically. According to Khamidah, Winarto & Mustikasari (2019) interactive multimedia learning media can foster students' creativity and enthusiasm in learning. Learning innovations using digital game or multimedia methods can increase students' learning motivation compared to using manual drawing methods (Sunarti, Rahmawati & Wardani, 2016).

Quartet cards are an interactive and interesting learning media. This media was created to overcome several problems that can reduce students' interest in learning and scientific competence in animalia material. The lack of interaction between students in learning has the effect of decreasing students' interest in learning. This statement is in line with the statement (Durin et al. 2019; Novita et al. 2021), that card game media improves learning outcomes, bridging the gap between theory and practice in teacher learning. (Yuniarti & Komarudin, 2018) in their research revealed that the lack of interaction between students in learning can reduce interest in learning, social and emotional relationships between students. According to Marchetti & Valente (2015) card learning media is a meaningful, familiar and interesting learning media in its learning context, to motivate and involve players/students and also to promote a social, rich and constructivist educational experience while at the same time integrating modern technology and innovative game-based approach. This animal quartet is a type of game used in science learning which is packaged in an interesting and fun way for students. Fun learning conditions can be designed through interaction between players, challenging game strategies or through interesting and varied media presentations.

Integrating elements of play in the learning process can give rise to "internal" elements (enjoyment, motivation, enthusiasm and curiosity) and "external" elements (modeling, discovery and problem solving). When children play, they not only gain certain knowledge but also the mindset to use scientific understanding to solve problem solving challenges, make appropriate decisions, be fun and entertaining (Amni, Ningrat, 2021; Putri, 2023; Christiani, Sudarmin, and Subroto, 2012) . The ability to solve problems is a form of critical thinking. The ability to solve problems is not just knowing the right solution to solve the problem, but must be able to demonstrate the ability to recognize problems and evaluate decisions/solutions.

In general, Animalia material consists of 9 phylum, namely; Porifera, Coelenterata, Platyhelminthes, Nematelminthes, Annelida, Mollusca, Arthropoda, Echinodermata and Chordata. has a very wide range of material. Kingdom Animalia is a prerequisite material for classifying the various animals spread across our earth. The material characteristics of the animal kingdom are closely related to the grouping of animal diversity, understanding the Latin names of each animal, the movement system, morphology and physiology of each animal and their uniqueness, requiring students to carry out experiments and direct observations of these animals. The biggest obstacle is the unavailability of specimens in the school laboratory, so that students do not have the opportunity to make observations, analyze scientific phenomena related to the diversity and role of animalia in the surrounding environment. The multimedia-based Animal Quartet in this research utilizes card media which is integrated with educational-recreational learning strategies. Each card is equipped with critical and contextual questions. On the other side, the card is equipped with a barcode which contains information in the form of images and videos of Animalia's unique behavior. This feature is expected to improve students' long-term memory regarding the material being taught. Students will continue to remember and will raise awareness for students to learn independently and think critically in solving problems.

METHODS

This research aims to determine the effect of using Animal Quartet learning media on students' scientific literacy competencies. This type of research is quantitative descriptive with a quasi-experimental one group pretest-posttest design. This research was conducted at MAN 3 Makassar City. The research subjects were 30 class X MAN 3 Makassar students. The research data source comes from students who carry out the learning process using the Animal Quartet Card media. Quantitative data is obtained from the results of students' learning scores, with a score range of 10 – 100. The use of Animal Quartet Card media is categorized as effective if it meets the requirements, namely increasing students' scientific literacy at least in the "high" category ($G \geq 0.7$) and the percentage of students with these criteria is at least 76% (Mardapi 2008).

Quantitative data is processed using descriptive analysis to determine the average, maximum score, and minimum score of student learning outcomes before and after implementing the Animal Quartet. The data was then analyzed by changes in student learning outcomes, using pretest and posttest data and calculating the gain score, according to Hake (1998) is the achievement of student learning outcomes as measured by changes in pretest and posttest scores. The gain score value is obtained from the difference between the posttest and pretest divided by the maximum gain score that students can obtain, namely the maximum score minus the pretest value.

The gain score calculation formula adapted from Hake (1998) is:

$$g = \frac{\text{postes} - \text{pretes}}{\text{skor maksimal} - \text{pretes}}$$

Next, the gain score is compared with the gain score criteria adapted from Hobri (2010) below.

Table 1. Gain Score Category

<i>Gain score</i>	Category
(g) > 0,7	High
0,3 - 0,7	Medium
(g) < 0,3	Low

In the data collection process, researchers used the PISA scientific literacy test instrument with a reliability of 0.724. This instrument consists of 30 questions which include (a) understanding concepts, (b) high-level thinking skills, (c) applications of science in everyday life, (d) solving scientific problems. The data that has been collected is analyzed quantitatively using SPSS version 23. Researchers carried out descriptive statistical tests, paired sample correlations, and paired T-test to determine the effect of animal quartet cards on students' scientific literacy.

RESULT

The following is a summary of the average scores of students' scientific literacy competencies.

Table 2. Summary of paired sample statistics pretest and posttest

		<i>Mean</i>	<i>N</i>	<i>Std. Deviation</i>
Pair 1	<i>Pretest</i>	41,86	30	3,89
	<i>posttest</i>	94	30	2,28

Based on table 2, it is known that the average pretest score (before using the Animal Quartet Card learning media) was 41.86. Meanwhile, the average scientific literacy score of students after the application of the media (posttest) was 94. Based on these calculations, descriptively there is a difference in the average value of students' scientific literacy competency. Furthermore, to prove whether the difference is significant or not, it is necessary to interpret the results of the paired sample t test analysis with the T test. The hypothesis is:

Ho = There was no significant difference in the mean scores of students on the pretest and posttest

H1 = There is no significant difference in the mean scores of students on the pretest and posttest.

Analysis of the results of the paired sample test and hypothesis testing is shown in the following table.

Table 3. Results of paired sample test and hypothesis testing

		<i>t</i>	<i>df</i>	<i>Sig. (2-tailed)</i>
Pair 1	Pretest- posttest	-70,22	29	.000

Based on the calculations and tests carried out, a sig (2-tailed) value of 0.000 was obtained, which is smaller than $\alpha(0.05)$. This shows that Ho is rejected and H1 is accepted. So it was concluded that there was a significant difference in the mean scores of pretest

and posttest students in the application of the Animal Quartet Card learning media. Further results of the N-gain analysis are shown in table 4.

Table 4. Summary of pretest and posttest N-gain analysis

		Mean	
N-gain Skor	Kategori	N-Gain Persen	Kategori
0,89	Tinggi	89,68	Efektif

Based on the table above, the N-gain score is 0.89, which is in the high category. Then the N-gain percentage results were obtained at 89.86% which shows the effective category. So it can be concluded that after implementing the Animal Quartet Card learning media, there was a significant and effective difference in increasing students' scientific literacy competency.

DISCUSSION

The increase in the average scientific literacy competency score of students after learning using Animal Quartet Card media is in line with research (Marlina, Yokhebed, and Thamrin, 2018), that game media can improve discipline, learning outcomes and students' critical thinking processes in solving problems in their lives. After using the Animal Quartet in learning, students have a positive perception of learning about the animal kingdom so they are more sensitive to the environment and its changes. In addition, (Adnan, Salmawati, Usman, 2023) students have the ability to understand the concept of animal diversity and utilize the unique behavior of these animals in solving environmental problems.

The application of the Animal Quartet Card learning media is carried out in pairs or groups and interacting with other friends (Lubis et al., 2022; Lubis & Dasopang, 2021; Ningsih et al., 2023). Students can also see specimens and their behavior directly through videos packaged in barcode form, thus fostering students' curiosity and high learning motivation to solve scientific problems. Students can witness firsthand the unique ability of each animal to defend its life from predators and natural conditions of its habitat. (Helwig et al. 2021) stated that learning that integrates life safety values and strong emotions can improve students' long-term memory regarding the material being taught. Students will continue to remember (Crystallography, 2016; Putri, and Kurniawan, 2022), and raise awareness for students to learn independently (Nurmalita, Munzil, and Pratiwi, 2021). Game media can help students to understand and recall explanations given by the teacher, utilize their understanding to solve problems and test students' understanding in a fun way. This statement is in accordance with (Setiawan & Santosa, 2021; Yuniarti and Komarudin, 2018) explaining that edutainment-based multimedia games aim to test students' understanding of scientific material taught through fun games, so that students are more motivated in learning and learning outcomes can be achieved. achieved optimally.

In the same opinion by (Sunarti et al. 2016), someone chooses to play for several reasons, including liking the opportunity to "fantasize and relive unusual moments" and being entertained by playing board and card games such as Monopoly and Quartet Games. Other researchers have found that many educational games are useful for learning knowledge and improving group work skills (Melissa, M., Swandi, I. W., Raditya, A., Design, J., Visual, K., Seni, F., & Petra 2014), improve decision-making abilities (Durin et al. 2019), and create a healthy psychological environment in the classroom, during lessons (Marchetti and Valente 2015).

This animal quartet game is designed to meet students' learning needs. This media provides short reading and several environmental problems related to animals which are presented in an interesting and fun way. The Animal Quartet learning media is multimedia-based which consists of a combination of several learning styles, namely

visual (images and videos), audio (sound on the video displayed on a card via a barcode which can be accessed by students using Android. Students can also be more motivated to add information through practical E-modules in Animal Quartet cards (Indra Jayanti et al. 2022; Setiawan and Santosa 2021), stating that educational-recreative games are able to foster students' interest in learning something and encourage students' critical thinking. Students also will be enthusiastic in finding solutions to various challenging problems.

CONCLUSION

The educational learning media Animal Quartet Cards, in its application, is effective in increasing students' scientific literacy. This media can make it easier for students to better understand and classify animals based on their morphology and locomotion and apply this understanding to solve problems in life. Students are no longer confused about what types of animals will be identified and classified, because they can see videos of animal movements, morphology and habitat via the barcode link listed on the card.

Recommendations for schools, especially in the field of curriculum, to facilitate learning activities that increase learning innovation for teachers to create fun digital technology learning media. Biology teachers need the Animal Quartet edugame media as a learning aid for students to improve scientific literacy competency. This Animal Quartet media can be further developed to suit the learning needs of biology or other subjects to improve students' scientific literacy competencies.

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