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The Development of Picture Story Book to Improve the Science Literacy Skills of Grade 4 Elementary School Student

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ABSTRACT

Scientific literacy can be interpreted as a person's ability to study science and then implement it in everyday life so that he is able to act wisely as a person or as a social being. This study aims to produce a picture story book learning tool that is valid, practical, and effective to improve the science literacy skills of 4th grade elementary school students. The research method used is R&D with a static-group pretest-posttest design. The sample is grade 4 students with 30 students as the control and 30 students as the experimental class. The data were collected by using validation, observation, questionnaire, and test sheets. The results showed that the scientific literacy test results had increased. The mean pretest score for the control class was 55.1 and posttest score for the control class was 67.4. The average pretest score for the experimental class was 59.07 and posttest score for the experimental class was 86.8. The N-Gain mean for the control class was 0.27 and 0.70 for the experimental class in the medium category. Based on the results and discussion, using picture story books in science learning provides a solution to the problem of students' low scientific literacy and makes it easy for students to learn because the appearance of the book is very attractive, lots of pictures and colors. Not only providing material, but there are practice questions and scientific investigation activities.

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INTRODUCTION

Literacy culture is one of the requirements for life skills in the 21st century. As a large nation, Indonesia must also develop this culture through integrated education between families, schools and society. Mastering the six basic literacy skills decided upon with the World Economic Forum in 2015 plays a crucial role not only for students, but for parents and all members of society as well. The six basic literacy skills include reading, arithmetic, science, digital literacy, financial literacy, cultural literacy, and citizenship.

Scientific literacy is one of the basic literacy that must be mastered by students. Scientific literacy can be interpreted as a person's ability to study science and then implement it in everyday life so that he is able to act wisely as a person or as a social being.

Binkley and OECD (2013) in PISA (2012) Assessment and Analytical Framework stated that 21st century skills include critical thinking skills, problem solving, self-management, information and communication technology (ICT), communication, and technology. Not much different from the competencies that are the focus of the world of education in Indonesia, namely religious character, nationalism, innovation and creativity, proficient in critical reasoning and problem solving, adept at communicating and collaborating, as well as media, technology and information

(Sajidan et al., 2018). These skills must be possessed by students in order to be able to compete in the challenges of future developments.

The regulations of the ministers of education, culture, research, and technology Number 5 of 2022 concerning Graduate Competency Standards in Chapter IV Article 5 explains that graduate competencies that must be mastered by Elementary School students include developing literacy and numeracy abilities of students in further education. In the following article it is also formulated in an integrated manner in the form of competency descriptions, including: demonstrating skills in communicating ideas, carrying out simple creative activities or works, and finding solutions to problems, and using local wisdom; demonstrate the skills to ask questions, explain and communicate the knowledge gained or the challenges encountered; demonstrate a skill and love of reading and be able to record one's own experiences and feelings.

Based on the Graduate Competency Standards, in learning the teacher should encourage students to always do research on any information obtained, view an event from various sides, develop curiosity, and get used to always thinking before having an opinion. In addition, teachers can also provide sufficient opportunities for students to always think critically, creatively, collaborate, and communicate in every lesson. The hope is that they can compete globally in welcoming the 21st century.

Scientific literacy is one of the six basic literacies. In elementary school subjects, students generally study science as part of scientific literacy. Wisudawati and Sulistyowati (2014) define science as a collection of observational and empirical information that is organized in a systematic and structured manner, widely accepted (universal), with four key components, namely attitude, process, product and application. The four components are designed to be integrated into science learning so that students can obtain the learning process as a whole and use their curiosity in order to understand natural phenomena with problem-solving activities that apply the steps of the scientific method.

Science as a process emphasizes scientific ways of obtaining scientific products. The activities consist of various process skills including observation, classification, measurement, communication, inference, and experimentation (Abidin, 2017). At the level of scientific attitudes, learning science always applies systematic scientific methods in order to produce science products. The scientific attitudes built include: curiosity, what it is, openness, tolerance, hardworking, confident, courageous, and willing to collaborate. The hope of habituating these activities and attitudes is the formation of students with critical thinking skills, making sense, being creative, innovative, and being able to compete globally when entering the 21st century.

Based on the description above, scientific literacy plays a crucial role for students in facing all problems in the 21st century. Fananta et al. (2017) suggest that scientific literacy can encourage students to build a frame of mind and personality and shape human character so that they can sympathize and consequently to oneself, members of society and the universe, as well as the challenges experienced by today's technology-laden global society. Scientific literacy is not enough to require information about scientific principles and theories alone. However, information about steps and implementation related to scientific research and knowledge about how to improve science is also needed. For this reason, scientific literacy is seen as the main skill that plays an important role in improving human welfare now and in the future.

Scientific literacy itself can be interpreted as information and scientific skills in order to recognize questions, obtain actual information, explain scientific phenomena and draw conclusions according to facts, explore the characteristics of science, understand how science and technology build the universe, intellectual and habituation, and the desire in order to be able to participate and get to know issues related to science (OECD, 2019).

According to Filjinan et al. (2022), scientific literacy is a deep ability understand science, inform science in form orally or in writing, and using knowledge science in solving problems so have a high attitude and self-awareness himself and the surrounding environment in the taking decisions based on scientific considerations. Sudarsono et al. (2020) states that scientific literacy is ability to use scientific knowledge to recognize existing problems. Recognize the problem in this way identify the problem and draw conclusions based on facts and evidence.

Based on some of the opinions above, scientific literacy can be interpreted as a person's ability to study science and then implement it in everyday life so that he is able to act wisely as a person or social being. To learn science subjects, it is not enough for students to understand scientific concepts and processes to obtain basic science education. However, he must be given the opportunity to actively participate in its implementation in real cases. Students who know, but cannot use it meaningfully in everyday life, lack basic science education.

Based on the observations of researchers, science teachers in Indonesia still do not fully understand science learning towards increasing students' scientific literacy. Likewise in terms of teaching materials, teachers only focus on teaching materials provided by the government or schools without analyzing the contents of these teaching materials. This causes learning activities to tend to be traditional and based on understanding students' concepts. This can be seen from the results of various international quality assessments of students' science achievement.

The results of this assessment show that the achievements of Indonesian students tend to be far below some other countries in the world. Therefore, strategic steps are needed in training scientific literacy. One reason is that scientific literacy-based learning contains knowledge and understanding of scientific concepts and processes needed by everyone to make decisions, participate in social life and cultural diversity, and increase economic productivity (Widodo, 2020).

The 2018 PISA (Program for International Student Assessment) survey conducted by the Organization for Economic Co-operation and Development (OECD) has not shown good results because the average scores of students tend to lag behind the world average. At the level of scientific performance, Indonesia achieved an average of 396. Followed by Saudi Arabia with an average of 386. The highest order is China with an average of 590 in 2018. This result is of course very different from the world average, which is 489 (OECD, 2019). With these results, the average science skills of Indonesian students only matched the skills of knowing some basic facts. They cannot communicate and connect these skills with some science material, especially implementing complex and theoretical concepts.

Plus the results of the education report card in 2022 issued by the Education Assessment Center of the Ministry of Education and Culture. Education report cards throughout Indonesia in general show that less than 50% of students have reached the minimum competency limits for literacy and numeracy. In the aspect of the teacher's reflection index, the learning quality development activities carried out are not yet structured. Teachers have not been consistent in reflecting on learning, exploring new teaching references, and sparking new innovations.

Not much different from the education report card at SDN Prajuritkulon 2, Mojokerto City. For indicators of scientific literacy ability, a score of 64.29 is obtained. This means being ranked lower middle class at the provincial level and upper middle class nationally. This achievement shows that the majority of students have reached the minimum competency limit for reading literacy. As for the numeracy ability indicator, a score of 28.57 was obtained. This means being ranked lower middle class at the provincial level and upper middle class nationally. This achievement shows that 40% - 70% of students have achieved the minimum competence for numeracy. However, efforts are needed to encourage more students to achieve minimum competencies.

The low achievement of science learning shows that science learning activities in several Indonesian schools have not focused on the achievement of students' scientific literacy results. This situation requires immediate improvement and solutions to improve the quality of science learning, especially at the elementary school level. Studying science at school is a key component as a determinant of the quality of students' science learning. The most important thing in learning science is to use an in-depth approach, considering intrinsic motivation, curiosity, and the meaning of the task (Suprapto, 2017). There are several variables that must be considered in learning science, including: cognitive beliefs, affective states, and perceptions of control.

In line with this, the facts found in SDN Prajuritkulon 1 and 2 in Mojokerto City show that grade 4 students' natural science learning achievements tend to be less than optimal. This is indicated by the number of students who get scores under the learning objectives achievement

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criteria in science subjects. A total of 60 students, no more than 12 students who were able to achieve scores above the criteria for achieving learning objectives. So, it can be said that almost 80% of students scored below the criteria for achieving learning objectives. The lack of optimal learning achievement of students is due to the fact that the learning process places more emphasis on students' knowledge of the material being studied and is rote in nature so that students experience difficulties in answering questions that require high-level thinking involving scientific processes and attitudes. Science learning outcomes should not only emphasize products, but rather the processes and attitudes of science. This shows that the scientific literacy skills of grade 4 students are low.

Based on the facts obtained, the researchers conducted observations and interviews with grade 4 teachers at SDN Prajuritkulon 1 and 2 in Mojokerto regarding the textbooks used and science learning activities at school. Of the textbooks used by teachers in the classroom are books published by the Ministry of Education and Culture which include student books and teacher books. The books used by teachers do not contain scientific literacy skills. In addition, there are no other handbooks provided in schools to support science material, nor are there examples of books that teach scientific literacy in elementary schools.

The science books available in schools only present subject matter, experimental activities, and practice questions. There is no characterization of the story which is illustrated through various phenomena. The appearance of the book tends to lack pictures and colors, practice questions have not trained students' scientific literacy skills, and there are no practice questions accompanied by discussion.

Widodo (2020) explains that the scientific literacy skills of Indonesian students have indeed increased from time to time. However, the fact is that it is still below the world average. This shows that the scientific literacy of Indonesian students needs to be improved with various efforts during learning at school. Furthermore, this increase can be achieved by applying creative ways that attract students' interest so that students become interested in reading, thinking, conducting investigations, and making decisions related to the problems given.

Many strategies have been used to improve the scientific literacy skills of elementary students. Among them by using teaching materials. Toharudin (2011) states that teaching materials are things that contain good learning messages that are specifically targeted, such as educational cinema, maps, graphics, and textbooks. Sources of teaching materials are the means by which teaching materials can be obtained. Sources of teaching materials can be in the form of textbooks or other references. Teachers can also design their own teaching materials. This is even emphasized because the teacher's teaching materials are of course made according to the needs and characteristics of students.

To improve scientific literacy skills in elementary school children, among others, by developing picture story books. Adipta et al. (2016) stated that picture story books are books with illustrations and words that do not stand alone, but are related to one another as a narrative unit. Further Sadiman (2018) in providing an overview of the presentation of images or illustrations in textbooks. Submission of illustrations presented must be based on the subject matter and learning objectives, original, as it is, presenting the real form and atmosphere. A good illustration must be straightforward, have a bright structure, show the main image, and the proportions of the image must show the true form so that it is free from misunderstandings among students. For example, a cow in an image should appear larger than a chicken.

The description gives an idea of how important textbooks are. Initially, the notion of readability (literacy) was only used at the verbal level, namely reading and writing. However, in the 1960s, the principle of visual legibility in graphical forms such as sketches, drawings, photographs, graphs and tables began to emerge. Such as a comics. Comics help students learn scientific approaches within the framework of stories, providing new avenues for inquiry-based science learning (Affeldt et al., 2018).

Uludag (2023) states that picture storybooks have essential contributions to children's learning and perception. In addition, these books deal with the book's subject with pictures so that children can grasp the subject better. The use of illustrated books is an effective way to give

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children experience of reading. The illustrated books have less vocabularies which stimulate the children to love reading. The striking color of the books can improve children's beginning reading skill, motivate them to read, and arouse their curiosity (Utomo, 2018).

Textbooks with illustrations in them serve to provide visual and emotional information that cannot be communicated through the text itself (Krissandi, 2018). Rosyana et al. (2021) states through picture story books children also find it helpful to be able to understand reading content by looking at pictures that support the story, besides that pictures can also provide a relationship with the content of learning material. Picture story books are in line with the increase in students' reading skills, they realize that reading is very important, but what is more important is how they are able to choose the right reading books for students according to their developmental period.

Research on efforts to improve scientific literacy skills in elementary school students has been carried out a lot. Nursholihat et al. (2017), through his research on the Role of Comic Media on the Scientific Literacy of Grade 5 Elementary School Students on the Subject of the Water Cycle proved to be successful in fostering students' scientific literacy skills. This is indicated by the existence of a two-mean difference test from the pretest and posttest data using the W-test (Wilcoxon) with a significance level of $\alpha = 0.05$ obtained p-value (Sig.2-tailed) = 0.000. The results obtained are P-value < α. So, H0 is currently unacceptable, meaning that there is an increase in the scientific literacy of grade 5 elementary school students on the subject of the water cycle through the comic "Today's Rain". Meanwhile, the normalized confirmation test gives an average of 0.54 which indicates moderate gain.

In line with the research above, Farenda (2018) in his research on the Development of Picture Story Books Against Science Learning Literacy in Elementary Schools shows that the level of validity of the subject validators in the class is very valid with an average of 4.8 and the language validators in the class are very valid. ie 4.4. The practicality of the picture story books obtained from the teacher's response got an average of 4.75 at a very valid level, students' responses obtained an average of 4.6 with a very valid level as well. According to the results obtained, it can be concluded that the development of picture story books in improving science learning competence in elementary schools is classified as very valid and very practical to be used in learning activities.

The next research was conducted by Niswatuzzahro et al. (2018). His research on the use of audiovisual media by applying the discovery learning model to increase scientific literacy in 5th grade elementary school students has been proven to be able to foster students' scientific literacy. It can be seen from the final results of the research that the average classical scientific literacy score is in the high category of 81.5%.

Research entitled Using Science, Technology, Society, and Environment (STSE) Approach to Improve the Scientific Literacy of Grade 11 Students in Plant Growth and Development a by Chanapimuk et al. (2018) shows an increase in students' skills before and after learning. In the pretest, the competence of students is 61.22%. After the students learned through the STSE approach, the post-test scores were higher than the pre-test, respectively 84.19% and 57.90%. The STSE approach is proven to be able to improve scientific literacy competence. The percentage of students' competency scores continuously increased from cycle 1 to 3, respectively 60.78% and 87.65%.

Badeo et al. (2021) in his research entitled Use of Comic-based Learning Module in Physics in Enhancing Students' Achievement and Motivation revealed that the use of comics as a medium for learning science can increase students' understanding. Comic-based material has the potential to convey messages in a coherent, clear and fun way. Comics can increase the enjoyment of reading science because of their funny nature in telling science ideas. Comics also have an image appeal so that students learn science concepts and ideas in a visually entertaining way.

Many studies have been developed related to efforts to improve scientific literacy skills for elementary school students. However, similar research has never been conducted at SDN Prajuritkulon 1 and 2 in Mojokerto City, let alone using teaching materials in the form of picture story books. So far, the teaching materials used by teachers are books compiled by the Ministry

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of Education and Culture. While the learning method applied to science learning is in the form of lectures and various practical activities.

The teaching materials only present subject matter, experimental activities, and practice questions. There is no characterization of the story which is illustrated through various phenomena. The appearance of the book tends to lack pictures and colors, practice questions have not trained students' scientific literacy skills, and there are no practice questions accompanied by discussion. In contrast to the picture story books developed by researchers. There are several characters presented in the picture story book, the appearance of the book is rich in pictures and colors, the questions that are arranged are able to train students' scientific literacy skills, and there are practice questions accompanied by discussion.

Some of the studies mentioned above can be used as references or the development of similar media for subsequent research activities. This study discusses the use of picture story books on the water cycle material as an effort to improve scientific literacy skills in grade 4 elementary school students. The subject matter is material contained in class 4 even semester in the independent curriculum. The selection of this topic is adjusted to activities that occur in everyday life and those that are closest to the child's environment.

Researchers assume that the development of picture storybook media is a form of innovation from learning media on water cycle material that is able to foster scientific literacy skills from conventional learning in general. Through the development of picture story books it is hoped that students' scientific literacy skills will increase because choosing picture story books is the best solution considering that elementary school children tend to like reading stories and which contain colorful illustrations compared to full text books. With the presence of picture story books, it is hoped that students will understand more about the water cycle material because most of the material is described in the form of illustrated pictures.

The purpose of this study was to make a valid, practical, and effective of picture story book in order to increase the scientific literacy of grade 4 elementary school students.

RESEARCH METHOD

The research method used is R&D with a static-group pretest-posttest design. The sample is grade 4 students with 30 students as the control class and 30 students as the experimental class. The data were collected by using validation sheets, observation sheets, questionnaire sheets, and test sheets. The validation sheets were analyzed using percentages, observation sheets and questionnaires were analyzed using percentages, scientific literacy test results were analyzed using the N-Gain and the independent sample t test. The research flowchart is shown in Figure 1.

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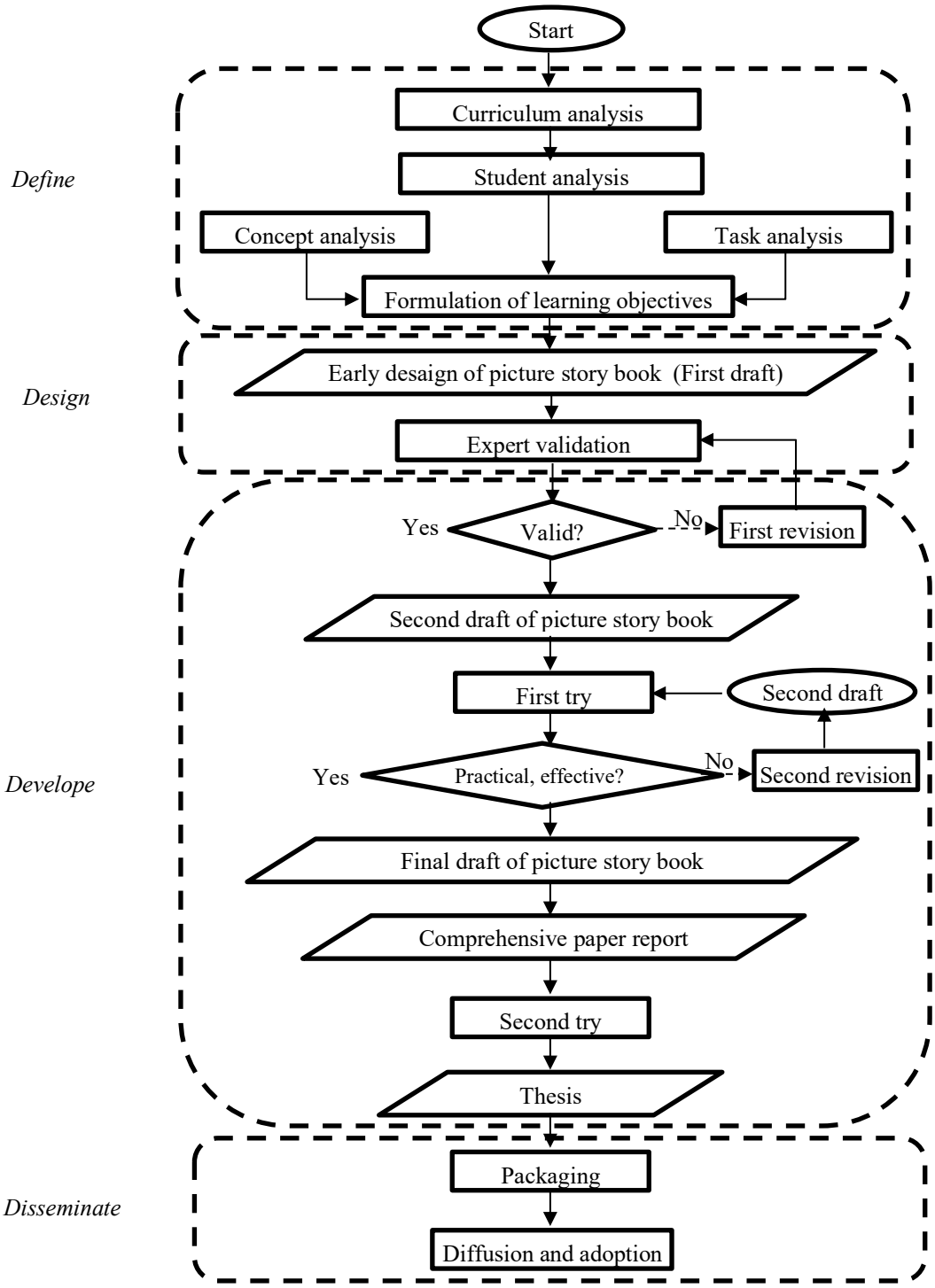


Figure 1. Research flowchart

RESULTS AND DISCUSSION

The picture story books developed in this study are in the form of a mix of stories and pictures used by students during the learning process. The picture story book developed consists of a cover, preface, table of contents, scientific literacy competence, scientific literacy competency indicators, material, concept exploration, practice questions, glossary, bibliography, and author profile. The material developed in the picture story book is material about the water cycle.

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Figure 2. Display of the cover for a picture book



Figure 3. Display of the beginning of the book

The results of the scientific literacy test are obtained by conducting assessments before and after learning. Prior to learning, a pretest was carried out to determine students' initial scientific literacy abilities and after learning took place a posttest was carried out to determine the increase in scientific literacy ability results after receiving learning using picture story books.

The normality test that was carried out found that all data analyzed using the Kolmogorov-Smirnov obtained a value of Sig. > 0.05 so that it can be said that the data is normally distributed. The homogeneity test that was carried out found that all data analyzed using SPSS received a Sig. > 0.05 so that it can be said that the diversity of the data is homogeneous.

The paired sample t test that was carried out found that all data analyzed using SPSS received a Sig value. (2-tailed) < 0.05 so that it can be said that there is a difference in the average pretest score with the posttest score. The independent sample t test that was carried out found that all data analyzed using SPSS received a Sig value. (2-tailed) < 0.05 so that it can be said that there is a difference in the mean score of the scientific literacy test in the experimental class that uses picture story books and the control class that applies conventional learning.

Table 1. The comparison of the results of the control and experimental class scientific literacy tests

No	Sample	Mean of Pretest	Mean of Posttest
1	Control class	55,1	67,4
2	Experimental class	59,07	86,8

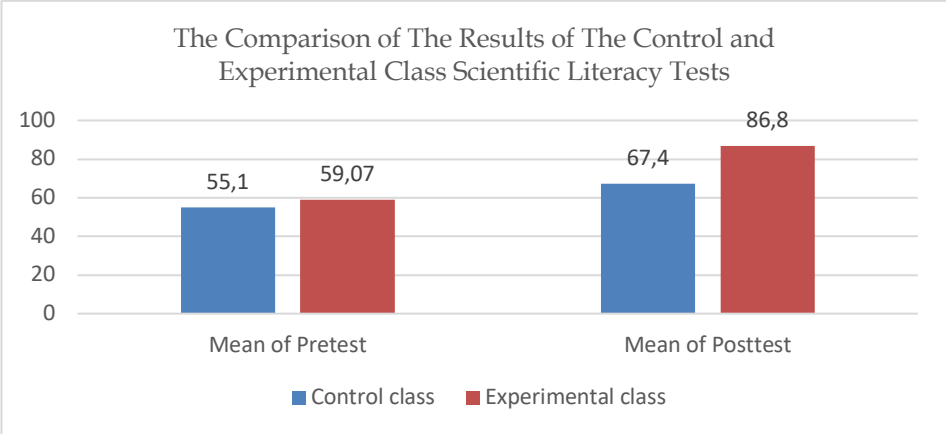


Figure 2. The comparison of the results of the control and experimental class scientific literacy tests

Based on Table 1 and Figure 2, phe pretest results in the control class showed an average score of 55.1 and the scientific literacy level was at level 3. Meanwhile, the posttest results showed an average score of 67.4 and the scientific literacy level was at level 3. The pretest results for the experimental class showed an average score of 59.07 and the scientific literacy level is at level 3. The posttest results show an average score of 86.8 and the scientific literacy level is at level 6. The low pretest score is because students have not received the material. Students are also not used

to solving problems that hone scientific literacy skills. From these results there was an increase in students' scientific literacy skills by 28.

The results of the pretest and posttest were then analyzed using N-Gain to determine the increase in the results of students' scientific literacy abilities. The N-Gain average for the control class is 0.27 so that it is in the ineffective category. Based on these results it can be said that conventional learning is not effective in improving students' scientific literacy skills.

The increasing students' scientific literacy skills in the experimental class with N-Gain values ranging from 0.29 to 1.00 in the moderate to high category. The overall N-Gain average is 0.70 in the moderate category. With an increase in N-Gain and an increase in students who are complete in learning, it shows that learning using picture story books can train students' scientific literacy skills in the water cycle material.

This is in accordance with the research of Suryanti, et al (2021) entitled Gadget-Based Interactive Multimedia on Socio-Scientific Issues to Improve Elementary Students' Scientific Literacy. From this study it was concluded that the SSI-GBIM with the theme "Healthy Food" is appropriate for improving the scientific literacy skills of elementary students, proven to obtain a validation score of 3.55 (from interval scores 1 - 4) with very valid criteria and good practicality seen from the participants' activities Dominant students are filled with student activities using developed media with a percentage of 28%. In the results of the scientific literacy test there is an increase from level 3 to level 4, with an N-Gain of 0.4 (in the medium category). These results indicate that SSI-GBIM can be used as an alternative learning media to improve the scientific literacy skills of elementary students.

Students' Scientific Literacy Ability in View of Three Competency Indicators

The scientific literacy ability in the competency aspect analyzed consists of three indicators of mastery of scientific competence, namely explaining scientific phenomena, evaluating and designing scientific investigations, interpreting data and scientific evidence. The three indicators of scientific literacy in the competency aspects measured have increased.

The highest increase occurred in the competence to explain scientific phenomena. This is known from the average posttest score of students on this indicator of 93.20. This increase can also be seen from the average N-gain value which shows an increase percentage of 77% and is in the medium category.

This high increase was due to several reasons. First, the picture story books used by students were declared valid and reliable by three validators. Second, the observation results show that 100% of teachers motivate/arouse students' interest by associating the material to be learned in everyday life at three learning meetings. This can also be seen in the content of picture story books which present scientific phenomena at the beginning and are not directly related to the material to be studied. Third, the results of observations of student activities show that 100% of students observe a phenomenon shown by the teacher either through videos or from picture story books. Fourth, from the student response sheet it showed that 100% of them were interested in learning science using picture story books, 93.3% stated that picture story books made it easier for them to understand the material because it was supported by language that matched spelling, refined and easy to understand (100%).

This is in accordance with Asyhari and Hartati's research (2015) which states that students' scientific literacy skills in indicators of explaining scientific phenomena increase by 57% and are in the medium category through scientific learning. This is also in accordance with the results of a study by Tjalla (2008) which shows that the highest scientific literacy competence of students in Indonesia is in the ability to explain scientific phenomena, while the lowest is in the ability to use scientific facts.

The indicators evaluating and designing scientific investigations have increased by 69% and are in the medium category. This increase occurred due to several reasons. First, a picture story book containing three scientific investigation activities used by students was declared valid and reliable by three validators. Second, the observation results show that 100% of teachers guide students in designing experiments during and 87% of teachers guide students in making

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observations. Third, the results of observations of student activities showed that 87% of students conducted experiments according to the LKPD instructions and analyzed the results of observations. Fourth, from the student response sheets it shows 100% of students stated that they had the opportunity to conduct experiments, make observations, and discuss. As many as 93.3% were happy to do the experiment according to the LKPD.

Through observing activities in scientific investigations, students are stimulated to start building their knowledge and can find the fact that there is a relationship between the object being observed and the subject matter to be studied. Majid (2014) explains that observing activities are very beneficial for fulfilling students' curiosity so that the learning process has high significance.

Kurniasih and Sani (2015) further stated that scientific investigation activities provide practical experience that can form strong memories and skills in doing. Things that become puzzles for students can be answered through scientific investigations. In addition, it avoids students' mistakes in drawing conclusions because they directly observe the course of scientific investigation activities.

The competency indicators for evaluating and designing scientific investigations still show an increase that is not optimal because there are still some students who like to joke and talk with their friends outside the learning context. Several other students were engrossed in discussion. This cannot be denied because basically they interact with their friends both in one group and friends from other groups.

As stated by Bandura et al. (1963) in Long et al. (2011) that in social learning theory explains that human behavior has a continuous reciprocal interaction between cognitive, behavioral, and environmental influences. Social learning theory proposes that many behaviors develop as a result of our observing others who perform them. Investigations by Bandura showed that children are more likely to become aggressive when they observe aggressive behavior in others.

Furthermore, the indicator of scientific literacy in the competency aspect that experienced the lowest increase occurred in the competency of interpreting scientific data and evidence, which was 63% and was in the medium category. The sub-indicators trained on this scientific literacy competency indicator include transforming data from one representation to another; analyze and interpret data and draw appropriate conclusions; and identify assumptions, evidence, and reasoning in science-related texts.

The results of observations on students, only 87% showed they analyzed the results of their observations and concluded the results of their observations. Meanwhile, on the student response sheet, 93% had not had the opportunity to conclude the material. This means that not all students have the opportunity to participate in these activities. This is due to insufficient time due to being used a lot in previous activities, especially during the experiment. Another cause is that students are not familiar with activities related to interpreting data and scientific evidence so that reinforcement and learning are needed that can improve scientific literacy skills, especially on these indicators.

Even though the increase in this indicator is not optimal, with the data and scientific evidence obtained from the results of scientific investigations, some students have been able to interpret and formulate solutions to problems. Through scientific evidence and findings, students can also develop their scientific literacy competence in explaining scientific phenomena. The ability of students to use scientific evidence and explain scientific phenomena will further develop through class discussion activities with the ability to argue and criticize facilitated by the teacher, in which students express opinions orally and in writing the findings of their group (Abidin et al., 2017).

Table 2. Data on students' science literacy ability from three indicators

No	Competency Indicators	Pretest	Posttest	N-Gain	Category
1	Explain scientific phenomena	72,40	93,20	0,77	High
2	Evaluating and designing scientific investigations	70,47	91,67	0,69	Medium
3	Interpret scientific data and evidence	34,37	75,27	0,63	Medium

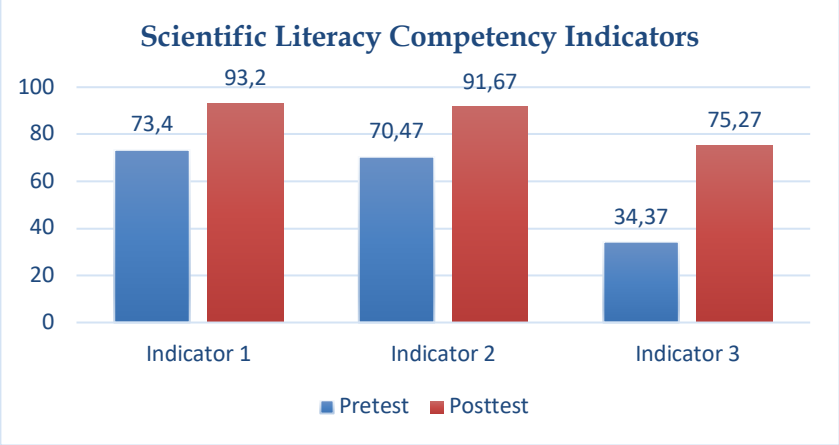


Diagram 2. Data on students' science literacy ability from three indicators

CONCLUSION

In conclusion, the development of picture story books was declared feasible, practical, and effective in learning science to improve the scientific literacy skills of grade 4 elementary school students. The content in picture story books can support science learning, students are also highly motivated in learning. Based on the results of this study, it is important to develop picture story books for students with low literacy skills. The methods for improving scientific literacy skills can be further investigated in future research.

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REFERENCES

Abidin, Y., Mulyati, T., Yunansyah, H., & Sari, Y. N. I. (2017). *Pembelajaran Literasi: Strategi Meningkatkan Kemampuan Literasi Matematika, Sains, Membaca, dan Menulis*. Bumi Aksara.

Adipta, H., Maryaeni, & Hasanah, M. (2016). Pemanfaatan buku cerita bergambar sebagai sumber bacaan siswa SD. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*, *1*(5), 989-992. http://dx.doi.org/10.17977/jp.v1i5.6337.

Affeldt, Meinhart, & Eilks. (2018). The use of comics in experimental instructions in a non-formal chemistry learning context. *International Journal of Education in Mathematics, Science and Technology (IJEMST)*, *6*(1), 93-104. https://doi.org/10.18404/ijemst.380620

Antoro, B. (2017). *Gerakan literasi sekolah dari pucuk hingga akar (Sebuah refleksi)*. Direktorat Jenderal Pendidikan Dasar dan Menengah.

Asyhari & Hartati. (2015). Profil peningkatan kemampuan literasi sains siswa melalui pembelajaran saintifik. *Jurnal Ilmiah Pendidikan Fisika Al-BiRuNi*, *04*(2), 179-191. https://doi.org/10.24042/jipfalbiruni.v4i2.91.

Badeo, Ching U., Koc, Ong Kian. (2021). Use of comic-based learning module in physics in enhancing students' achievement and motivation. *Science Education International*, *32*(2), 131-136. https://doi.org/10.33828/sei.v32.i2.6

Chanapimuk, Sawangmek, & Nangngam. (2018). Using Science, Technology, Society, and Environment (STSE) approach to improve the scientific literacy of grade 11 students in plant growth and development. *Journal of Science Learning*, *2*(1), 14-20. https://doi.org/10.17509/jsl.v2i1.11997.

Fananta, M. R., Widjiasih, A. E., Setiawan, R., Hanifah, N., Miftahussururi, Nento, M. N., Akbari, Q. S., & Ayomi, J. M. (2017). *Materi Pendukung Literasi Sains*. Kementrian Pendidikan dan Kebudayaan.

Farenda, M. F. (2018). Pengembangan buku cerita bergambar untuk literasi pembelajaran sains di Sekolah Dasar. *Repository Universitas Jambi*.

Filjinan, S. K., Supeno, & Rusianto. (2022). Pengembangan e-komik interaktif untuk meningkatkan literasi sains siswa SMP pada pembelajaran IPA. *Jurnal Pendidikan Karakter*, *5*(2). https://doi.org/10.31764/pendekar.v5i2.9003.

Krissandi A. D. S., Febriyanto, B., Cahya, K. A., & Radityo, D. (2018). *Sastra anak: Media pembelajaran bahasa anak*. Bakul Buku Indonesia.

Kurniasih, I., & Sani, B. (2015). *Ragam pengembangan model pembelajaran untuk peningkatan profesionalitas guru*. Kata Pena.

Long, M., Wood, C., Littleton, K., Passenger, T., & Sheehy, K. (2011). *The psychology of education* (2nd Ed.). Routledge.

Majid, A. (2014). *Implementasi Kurikulum 2013: Kajian teoritis dan praktis*. Interes.

Niswatuzzahro, V., Fakhriyah, F., & Rahayu, R. (2018). Penerapan model discovery learning berbantuan media audio visual untuk meningkatkan literasi sains siswa kelas 5 SD. *Scholaria: Jurnal Pendidikan dan Kebudayaan*, *8*(3), 273–284. https://doi.org/10.24246/j.js.2018.v8.i3.p273-284

Nursholihat, K., Sujana, A., & Karlina, D. A. (2017). Peranan media komik terhadap literasi sains siswa sd kelas V pada materi daur air (penelitian pre-experimental terhadap siswa kelas V SD kecamatan Paseh kabupaten Sumedang). *Jurnal Pena Ilmiah*, *2*(1).

OECD. (2019). *PISA 2018 results (volume I): What students know and can do.* OECD Publishing.

Rosyana, A., Ilhamdi, M. L., & Dewi, N. K. (2021). Pengembangan buku cerita bergambar berbasis pendekatan saintifik pada pelajaran IPA. *Jurnal Pijar Mipa*, *16*(3), 302–309. https://doi.org/10.29303/jpm.v16i3.2473

Sadiman, A. S., Harjito, Haryono, A., & Rahardjo. (2018). *Media pendidikan: Pengertian, pengembangan, dan pemanfaatannya*. PT Rajagrafindo Persada.

Sajidan, Baedhowi, Triyanto, Totalia, S. A., & Masykuri, M. (2018). *Peningkatan proses pembelajaran dan penilaian pembelajaran abad 21 dalam meningkatkan kualitas pembelajaran SMK*. Direktorat Pembinaan Sekolah Menengah Kejuruan Direktorat Jenderal Pendidikan Dasar dan Menengah Kementerian Pendidikan dan Kebudayaan. http://repositori.kemdikbud.go.id/id/eprint/10842

Sudarsono, S., Abdurrahman, & Rosidin, U. (2020). Pengembangan cerita bergambar fisika berbasis stem untuk menumbuhkan literasi sains pada siswa SMP. *Jurnal Pendidikan Fisika, 8*(1). https://doi.org/10.24127/jpf.v8i1.2202

Suprapto, N., & Mursid, A. (2017). Pre-service teachers' attitudes toward teaching science and their science learning at Indonesia Open University. *Turkish Online Journal of Distance Education-TOJDE*, *18*(4), 66-77. https://doi.org/10.17718/tojde.340386.

Suryanti, W., & Yermiandhoko. (2021). Gadget-based interactive multimedia on socio-scientific issues to improve elementary students' scientific literacy. *International Journal of Interactive Mobile Technologies (iJIM)*, *15*(01). https://doi.org/10.3991/ijim.v15i01.13675.

Tjalla, A. (2008). Potret mutu pendidikan Indonesia ditinjau dari hasil-hasil studi internasional. *Jurnal Ilmiah PsikoEdukasi*, *6*(2), 100-120.

Toharudin, U. (2011). *Membangun literasi sains peserta didik*. Humaniora.

Uludag, A., & Cevik. (2023). Selection and reading of picture storybook for young children: A scale development study. *Bartın University Journal of Faculty of Education, 12*(2). https://doi.org/10.14686/buefad.1113030

Utomo, F. B. B. (2018). Developing illustrated story books to improve beginning reading skills and learning motivation. *Jurnal Prima Edukasia*, *6*(2), 118-128. https://doi.org/10.21831/jpe.v6i2.16456

Widodo, W., Sudibyo, E., Suryanti, S., Sari, D. A. P., & Setiawan, B. (2020). The effectiveness of gadget-based interactive multimedia in improving generation z's scientific literacy. *Jurnal Pendidikan IPA Indonesia, 9*(2), 248-256. https://doi.org/10.15294/jpii.v9i2.23208

Wisudawati, A. W., & Sulistyowati, E. (2014). *Metodologi Pembelajaran IPA*. Bumi Aksara.

https://doi.org/10.46627/sipose.v4i1.274

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