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Digital Based Science Learning Through a Scientific Approach in Elementary School

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Abstract

The rapid development science and technology can the main key in efforts to develop students' self-ability in the field science. The existence technological developments have a great influence on the world of education. One of them is self-ability can apply, namely the application digital literacy. This study aims to determine student activities and the effectiveness learning science with a scientific approach through digital literacy in elementary schools. This research is experimental research. The sample this study consisted of fifth grade students at SDN Bringin 01 and SDN Tambakaji 03 Ngaliyan districts, using purposive sampling technique. It is a sampling technique with certain considerations. Through it researchers in terms of the achievements and competencies students in each class. This research data using questionnaires, tests, observations, interviews. The results analysis teacher needs given digital literacy were further validated by media experts and used learning in the experimental class and control class. Student learning activities showed differences acquisition student activity scores through non-digital media with 76.4 good results, while student activities through digital literacy showed results 82.4 very good categories. The effectiveness science learning with a scientific approach through digital literacy can improve the learning outcomes experimental class with an N-Gain value 0.7366 medium criteria, while the control class with N-Gain value 0.5656 high criteria. The results study can conclude that learning science with a scientific approach through digital literacy can improve elementary school students' learning outcomes. In the end, it is hoped that similar research can carried out with other materials.

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INTRODUCTION

Learning is the spearhead of the educational process in an educational institution. Learning is a change in knowledge, skills and attitudes as well as criteria for learning (Dadri, 2019). Learning according to the interaction process carried out by teachers and students by using various learning sources as a study (Mujtahidin, 2017). Based on this learning process, learning activities emerge. Learning can show a person's activity that is done intentionally and consciously (Pane, 2017). The activity that appears is a person's activeness in making a change in himself through the mental aspects that exist in them, especially in the attitude of science.

Science is basically a science that studies the natural environment around humans. Rahma (2017) revealed that science is a subject matter that must be studied by students both at the elementary school level to the high school level. Science contains a collection of knowledge in the form of facts, principles, concepts and the discovery process and has a scientific attitude (Dewana, 2017). One of the efforts to create meaningful learning is that teachers can apply a scientific approach (Machin, 2014).

The rapid development of science and technology can be the main key in efforts to develop students' abilities in the field of science, especially in the use of technology. Technological developments have directly influenced the way of learning (Norman, 2016). The use of information and communication technology by children today expands the context of interpersonal relationships (Velez, 2017). The development of technology has a great influence on the world of education. One of them is self-ability that can be applied through digital literacy. Digital literacy combined with a scientific approach is expected to lead to the development of science learning activities through more interesting media so as to increase student activities and learning outcomes for fifth graders, especially the material for marine animal movement organs.

In fact, the teacher in delivering the material still uses the lecture model and uses learning resources from student books so that the teacher only refers to the teacher's book and does not provide an attractive visual appearance. Teachers are less effective in creating fun science learning (Parmin, 2015). Teachers must be able to organize activities in the teaching and learning process so that they run according to the line (Novelasari, 2020).

The current learning conditions are expected to lead to training in analytical thinking. Learning by applying a scientific approach can increase activity in it (Novelasari, 2020). The scientific approach can encourage students to be more active, can stimulate them to generate ideas and make it easier for students to understand the lesson (Baedhowi, 2018).

The scientific approach is a learning process designed in such a way that learners actively construct concepts, laws or principles through the stages of observing (to identify or find problems), formulating problems, formulating hypotheses, collecting data with various techniques, analyzing data, drawing conclusions, and communicate the concepts, laws or principles found (Karar, 2012). Another opinion reveals that the scientific approach is a learning approach that provides a view or principle that has certain stages to train abilities through learning activities that have been designed with certain scientific systematics. If something that appears is not well understood, speculate about the explanation then find some way to try the speculation (Ayatullah, 2021).

Based on the point of view of several experts on the scientific approach, it can be concluded that the scientific approach is student-centered learning, not the teacher. The teacher is only a facilitator. The scientific approach contains a learning process designed so that students experience active learning through stages. The reasoning process in this research is to visualize and communicate the results that have been compiled according to the facts in the form of locomotor systems in marine animals such as sea horses, sea stars, sea sponges with teacher guidance.

Piaget's theory tends to be widely used in the learning process, although this theory is not a teaching theory. This theory is a cognitive theory, students must be guided to actively find something they are learning. In presenting the material, it must attract the interest of students so that they are happy to be involved in the learning process. Piaget (Ibda, 2015) suggests that there are four stages of cognitive development, namely; (a). 0 – 1.5 years is the sensorimotor stage, the main characteristics of its development are based on action and step by step, (b). 1.5 – 6 years is the pre-operational stage, the characteristics of its development are using symbols or sign language and intuitive concepts, (c). 6-12 years or more is a stage of concrete operations, the characteristics of its development using clear or logical and reversible rules and immunity, (d). 12 years or more is the stage of formal operations, the characteristics of its development are abstract, purely symbolic, deductive, inductive and logical.

Fifth grade elementary school students are in the concrete operational stage, thus in providing subject matter, teachers are expected to focus more on teaching aids or media that are more concrete and logical. Involvement and acceptance in group life for elementary school age children is an interest and concern for positive and productive social competencies that will develop at this age. As a result of his association with peer groups, children tend to imitate peer groups both in terms of appearance and language. During their development period, children grow various means that can describe and process experiences in the world around them.

Taking into account the cognitive characteristics of fifth grade elementary school students with all aspects of their developmental dimensions, it is hoped that the developed teaching system will be able to serve meaningful learning needs for students. Through the delivery of appropriate subject matter, students can follow the lesson well, so that students are enthusiastic about learning, making science a fun lesson and the goals of learning itself can be achieved maximally and satisfactorily.

The term digital literacy is not new in the world of education. This term is defined as the ability to understand and use information from various everyday sources (Kemendikbud, 2017). Rila (2019) expands understanding of digital literacy. Digital literacy is an individual's interests, attitudes, and abilities in using digital technology and communication tools. Digital literacy is used to access, manage, integrate, analyze and evaluate information, build new knowledge, create and communicate with others. It aims to be able to participate effectively in society. Potter's conception (Widyastuti, 2016) reveals that efforts to digital-based community literacy are not just introducing digital media, but also synergizing daily activities that lead to increased productivity.

Digital literacy is similar to media literacy. Martin (2008) elaborates on communication literacy as a form of digital literacy. Furthermore, communication literacy is defined as the ability to communicate effectively individually or collaboratively in groups using publishing technology. The technology is in the form of text software, databases, worksheets, drawing tools. The technology can also be in the form of the internet and other electronic and communication tools.

Digital literacy is a combination of several forms of literacy, namely: computer, information, technology, visual, media, and communication. Sholihah (2016) reveals that digital literacy is an effort to find, use and disseminate information effectively. Digital media is a type of device in new media. In this study, what is meant by digital media literacy is the ability and expertise of an individual in utilizing computers, the internet, and digital tools. Aat is used as a means of supporting communication activities optimally.

Based on the explanation above, it can be seen that digital literacy is a person's ability to understand and use information consisting of various digital sources. In other words, the ability to read, write, and relate to information using the technology and formats that existed at the time. The related digital literacy in this study

is the ability of students to operate digital media in the form of audio and visual displays in the form of learning videos that can be accessed through student gadgets in science learning with a scientific approach through digital literacy to improve learning outcomes for grade V elementary school.

Various skill models are useful for improving one's abilities and are sometimes referred to as multi-literacy (Mardina, 2011). Digital literacy is also known as computer literacy. This literacy refers to expertise in using computers, the internet, and other digital tools. Meanwhile, another opinion reveals that digital literacy is an effort to know, to search, to understand, to analyze, and to use digital technology. Beetham, Littlejohn and McGill mention there are seven elements of digital literacy (JISC, 2017). The seven elements include information literacy, digital scholarship, learning skills, ICT literacy, career and identity, media literacy, communication and collaboration.

Elements of communication and collaboration are the focus of this research. Communication and collaboration as part of the elements of digital literacy. This element has the meaning that there is active participation in digital networks for learning and research. Communication and collaboration itself is the active participation of digital media users to streamline time. This is closely related to media as digital which has convergence (Stefani, 2017). Communication and collaboration has an individual competence which consists of use skills. This competency is the ability to access and operate media. While critical understanding is the ability to analyze and evaluate media content comprehensively. Then communicative abilities , namely the ability to communicate and participate through the media.

The purpose of this study is to describe the needs of teachers, to find out student activities in science learning with a scientific approach through digital literacy, as well as the significant difference in effectiveness between science learning with a scientific approach through digital and non-digital literacy for fifth graders in elementary school.

The benefits of this research as new knowledge for the community to be more interested in exploring and developing learning tools as well as providing information to readers about research in scientific approaches through digital literacy.

METHODS

This study uses quantitative methods. This research was conducted based on clear problems and potentials. This quantitative research design uses a quasi experiential design experimental research equivalent control group design. The population of this research is the fifth grade elementary school students in the Wijaya Kusuma cluster. The sampling technique used purposive sampling technique. This technique is a sampling technique with various considerations. Through the consideration of the researchers in terms of the achievements and competencies of the students of each class. The sample of this research is the fifth grade students of SDN Bringin 01 and SDN Tambakaji 03. Class V of SDN Bringin 01 is the experimental class and SDN Tambakaji 03 is the control class. The number of students in each class is 30 students, so the total is 60 students.

The variables in this study include related variables, namely learning outcomes, while the independent variables are science learning, scientific approaches, and digital literacy.

The technique of collecting data in this research is through questionnaires, tests, observations, interviews, and documentation. The questionnaire in this study used a 5-point Likert scale. Questionnaires are used to obtain information about the needs of teachers in the preparation of digital literacy. Learning outcomes test sheets in the form of multiple choice tests and descriptions are used to determine the effectiveness of student learning outcomes at the pretest and posttest for class V students. The valid need for teachers is measured through 23 items in the form of a questionnaire given to 2 respondents, namely the

fifth grade teacher at SDN Bringin 01 and SDN Tambakaji 03.

The observation sheet uses the form of participatory observation because it is carried out by researchers by going directly for some time until it is considered sufficient to find out the phenomena being studied. researched. The observation sheet in this study was used to observe student activities in the process of learning activities by applying digital literacy. Interviews were conducted in a semi-structured manner and could be conducted face-to-face or by telephone. The interview sheet is used to obtain information from the teacher directly. Furthermore, the documentation method in this study was used to obtain data regarding student scores after the study. In addition, the documents used to strengthen the data obtained in the study can be in the form of syllabus, lesson plans, teaching materials, student worksheet, photos of activities and other supporting documents.

Validity to test multiple choice questions and descriptions using biserial point correlation technique. Furthermore, the results are interpreted using the product moment. From the multiple-choice validity test that meets the valid criteria, there are 14 out of 40 questions and the invalid criteria are 26 out of 40 questions. While the validity test uses a description formula that meets the valid criteria of 8 questions and the invalid criteria of 12 questions. Invalid test questions will be eliminated or not used again when collecting research data. Furthermore, the results of multiple-choice reliability testing using the Spearman-Brown showed a value of 0.6749 in the high category, while the description test test using Cronbach's Alpha obtained a value of 0.479 with a sufficient category.

The data analysis techniques in this study were instrument testing and instrument validity testing. Statistical analysis and methods used for prerequisite tests which include normality and homogeneity tests, average similarity tests. The normality test using the *Kolmogorov Smirnov* calculated with SPSS version 25 with a level of 5% (0.05). To find out whether the data is normal or not, it is seen from the significance value. If the value of sig> 0.05, it can be said that the data is normally distributed.

The statistical formula for homogeneity test uses the *Lavene Statistical Test.* To analyze the difference in learning outcomes before and after being given treatment using a hypothesis test. The learning improvement test uses the normalized gain test. The criteria for the level of gain index according to Darusman (2013L 171) are high, medium, and low.

RESULTS AND DISCUSSION

Analysis of Teacher Needs on Digital Literacy in Science Learning with a Scientific Approach

At the analysis stage, the research subject was conducted an initial analysis. This aims to determine the extent to which they need the media to be applied by researchers. At the beginning of learning, an analysis is carried out first, namely the analysis carried out in the learning process which aims to determine the needs in the learning process. learning (Deadara, 2007). Analysis of teacher needs for digital literacy uses data collection techniques on interview sheets. The results of the analysis of teacher needs for digital literacy in science learning with a scientific approach are then applied to digital literacy that is compiled. After passing the validation stage of media and material experts. Then the final product of digital literacy in science learning with a scientific approach is obtained that is valid and ready to be used for research.

Science learning with a scientific approach through digital literacy is carried out as an effort to overcome problems in terms of limited media use. The use of this media is used to convey material that is difficult for children to understand directly, especially in the material for marine animal locomotion in fifth grade elementary schools. Based on the analysis of media needs at the school, the media used is still limited and simple so it is necessary to apply digital literacy. In line with the use of media to increase the ability to understand concepts such as literacy skills that are packaged in learning activities. One form of literacy is the use of video

as a medium of learning, the use of the internet, books and newspapers as learning resources (Septiary, 2020). The following are the results of the questionnaire on the needs of teachers in the application of digital literacy in Table 1.

Table 1 The results of the questionnaire on the needs of digital literacy teachers

No	Respondents 1	Respondents 2
1	Have you used the 2013 curriculum?	
	Yes	yes
2	Is science learning currently fun for students?	
	Not	Yet
3	Do you have any problems in teaching science? If so, what kind of obstacles?	
	Yes, there are obstacles when applying teaching aids in the delivery of science learning	Yes, have problems with science learning methods so it is difficult to accept the concept of science learning
4	Do you apply digital literacy in presenting science materials? If so, what digital literacy did you use?	
	Yes, through audio-visual-based learning in the form of the internet and e-books.	No, there are limited communication tools and networks, so it's enough to just use student textbooks.
5	Are students always active in teaching?	
	yes	no
6	Do you understand the scientific approach?	
	yes	yes
7	Have you ever implemented digital literacy using a scientific approach?	
	once	no
8	Do you ask questions to students or students who ask questions without being asked by the teacher?	
	Yes, the teacher gives questions to students and students who ask questions without being asked by the teacher	Yes, the teacher asks students questions
9	Among the applications of digital literacy in science lessons, which literacy do you choose?	
	Book, picture, video game	Book, picture, video game
10	How often should teachers use digital literacy?	
	sometimes	never
11	How should the sources be used to instill digital literacy?	
	Youtube, e-book, e-library, google schooler	youtube
12	Have you ever applied digital literacy in learning?	
	yes	yes
13	Do you like things related to digital or something real?	
	yes	yes
14	How about something you like?	
	real videos, pictures, walking, animated	real videos, pictures, walking writings, animated
15	What digital literacy do you use in the material for locomotor systems in marine animals?	
	Books, picture, video, internet	Not yet implemented, only student books

No	Respondents 1	Respondents 2
16	What form of digital literacy do you want?	
	include the title of the media, background image according to the theme, and a small description of the media.	include the title of the media, background image according to the theme, and a small description of the media.
17	What kind of audio effect do you want on digital literacy?	
	music effects in the form of music or song music musical	effects in the form of music or song music
18	Do you always use the guide in using digital literacy?	
	yes	no
19	What kind of display do you want?	
	portrait	landscape
20	What form of writing do you want in the digital literacy display?	
	times new roman	times new roman
21	What color background in digital literacy do you want?	
	gentle	sunny
22	What size digital literacy image do you want?	
	moderate	moderate
23	The desires time allocation for digital literacy?	
	20-30 menutes	20-30 menutes

Based on the needs that have been analyzed then the media is compiled and then tested by media experts. The digital literacy media that has been compiled then passes through the media expert validation stage so that it can be used in the next stage. The following is the result of the digital literacy display. The digital literacy visually is shown in Figure 1 as follows:

Figure 1. Teacher website introduction website

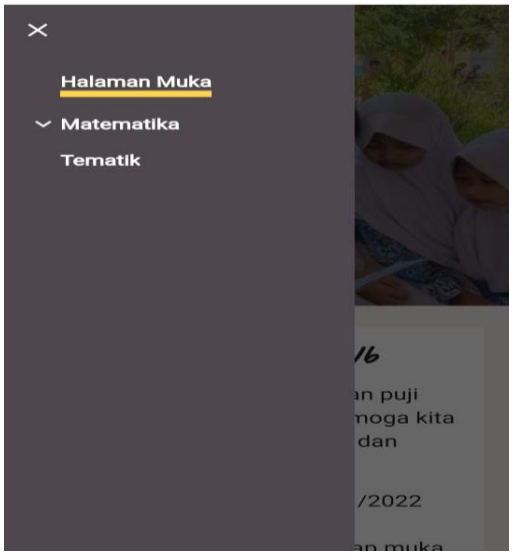

Figure 2. The main menu display of the teacher's

Based the figure 1 and figure 2, product validation is done by asking experts in their fields to assess the products that have been made. In this case, media products in the form of digital literacy have been carried out by two media experts. The results of the media expert's assessment on digital literacy obtained an average of 3.5 in the very good category and the results of the non-digital literacy assessment obtained an average of 3.5 in the very good category. Based on the assessment made by media experts, it was found that the media was valid and feasible to use.

Student Activities in Science Learning with a Scientific Approach Throuh Digital Literacy to Improve Learning Outcomes of Class Elementary Students

The 21 aspects observed included 8 types of student activities. Taking the value of this student activity using an observation sheet for the control class and the experimental class. These activities include students paying attention to digital literacy about the characteristics of living things, students paying attention to digital literacy about passive and active tools. As research conducted by Prilianti (2014) that there is a scientific approach in the 2013 curriculum, it is actually relevant to the potential and general goals of science learning. Through the implementation of a scientific approach that is presented with appropriate strategies and methods, students can be trained in scientific skills (Wina, 2017).

The next aspect is that students pay attention to friends who are reading texts about animal locomotion, student activity in answering questions about material in digital literacy, student activity in answering questions about the differences between vertebrate and invertebrate animals. In this aspect, students answered correctly according to the answers, conveyed confidently and fluently in the two classes studied. According to Chusniyah (2016) that science learning based on the 2013 curriculum applies an integrated concept. It is intended that students are able to solve problems with character in various aspects of life and the learning is fun and entertaining to increase interest in learning and the scientific character of students.

The next aspect is that students listen to sentences and sounds in digital literacy, students understand material about the movement organs of vertebrate animals and their functions, students understand material about the characteristics of invertebrate animals, students mention the movement organs of invertebrates and their functions, students understand material about characteristics invertebrate animals, students mention the organs of motion animals using fins and tails, students mention the organs of motion animals using fins and trails, students ention the organs of motion using tentacles, students sing a song entitled imitation of animal movements after listening to an example of a song sung by the teacher, students can see locomotion fish, squid, snails, seahorses, sea lions, sponges, starfish. This is in accordance with research conducted by Rahman (2017) that in learning science there is a new system that is useful for facilitating the delivery of material to students. In addition, through digital literacy, students can find out how the organs of marine animals move.

The following are the results of the students activity value in Table 2.

Table 2 Student Activity Value

No	Description	Control class mean	Experimental class mean
1	Pay attention to digital literacy about the characteristics of living things (breathing, moving, adapting, sensitive to stimuli, growing, breeding, excreting)	79	80
2	Pay attention to digital literacy about passive and active locomotion tools	61	85
3	Pay attention to a friend who is reading a text about animal locomotion	83	84
4	The activeness of students in asking questions about the material in digital literacy	84	84
5	Activity in answering questions about animal locomotion	74	77
6	Activity in answering questions about the differences between vertebrates and invertebrates	81	83
7	Listening to sentences and sounds in digital literacy	61	85
8	Understand the material about the movement organs of vertebrate animals and their functions	74	81
9	Understand the material about the characteristics of animals invertebrate	81	81
10	Name the movement organs of invertebrates and their functions	78	83
11	Understand the material about the characteristics of animals invertebrate	79	86
12	Name the organs of animal movement using fins and tails	75	82
13	Name the organs of animal movement using tentacle	82	86
14	Sing a song entitled imitating motion animals after listening to the sample song sung by the teacher	81	85
15	Can see the locomotion of fish, squid, snails, seahorses, sea lions, sponges, starfish	74	83
16	Write the organs of animal movement using whip feathers	77	82
17	Making animal decorative pictures	85	86
18	Sketching marine animal locomotion systems	74	83
19	Conducting experiments by imitating the movements of marine animal organs	77	79
20	Convey material conclusions about digital literacy displays	76	78
21	Children's impressions after seeing the digital literacy display	68	84
	Average	76	82

The next aspect is that students are able to write animal movement organs using whip feathers, make decorative pictures of animals, sketch the marine animal movement tool system, conduct experiments by imitating the movements of marine animal organs, students convey material conclusions about digital literacy displays, impressions children after involving digital literacy displays. The results of observing student activities show the average

results of student activities in science learning with a scientific approach through non-digital with 76.4 results showing good criteria. Meanwhile, the average result of student activity

in science learning with a scientific approach through digital literacy is 82.4, which shows very good criteria.

Efektifitiveness of Science Learning with a Scientific Approach Through Digital Literacy

This study using a scientific approach was carried out at SDN Bringin 01 starting from July 18, 2021. The study began with licensing at the end of March 2021. The target class of this research was class V SDN Tambakaji 03 as the control class. with the number of students as many as 30 students and class V SDN Bringin 01 as the experimental class with the number of students as many as 30 students. Science learning which is held with a scientific approach through digital literacy leads to an increase in learning outcomes, so the researchers conducted a pretest and posttest.

The data to be described is the data obtained as pretest and posttestdata, then the data is analyzed to find out the results of increased learning. This analysis consists of normality test, homogeneity test, and hypothesis testing (mean similarity). The following are the results of the experimental class analysis presented in Table 3.

Table 3 Experimental Analysis Results

No	Aspects of	Pretest	Postest
1	Number of students	30	30
2	Total score	965	2468
3	Average score	32.16	82.26
4	Minimum score	22	65
5	Maximum score	44	100

In Table 3 shows that there is an increase in value as a result of science learning with a scientific approach from the implementation of learning activities using digital literacy, meaning that digital literacy can have an influence on science learning with a scientific approach.

The following are the results of the control class analysis presented in Table 4.

Table 4 Control Analysis Results

No	Aspects of	Pretest	Postest
1	Number of Students	30	30
2	Total score	1017	2107
3	Average score	33.90	70.23
4	Minimum score	22	40
5	Maximum score	45	90

In Table 4 shows that there is an increase in value as a result of science learning with a scientific approach from the implementation of learning activities using non-digital media, meaning that non-digital media can also have an influence on science learning with a scientific approach.

The data obtained descriptively will be analyzed first using SPSS to find out more clearly the level of variation in the posttest both the control class and the experimental class.descriptive statistics posttest are presented in Table 5.

Table 5 Deskriptive Statistics *Posttest*

Data	N	Min	Max	Mean	Std.Deviation
Control Class	30	22	60	70.23	11.06
Experiment Class	30	22	100	82.26	7.83

Based on Table 3 it can be it was explained that from 30 students in both the pretest and posttest in the experimental class had different standard deviations. From these differences, it can be concluded that the data from posttest are more varied than the posttest .

More specifically, to find out and see the difference in the average scientific approach of science learning between the pretest and posttest, the data will be tested using a hypothesis test or an average similarity test. However, before that the data obtained will first be tested for normality and homogeneity.

Normality

Test The normality test was carried out on both pre and posttest with a sample of 30 students per test so that the total number of subjects was 60 students. By looking at the number of students, the normality test used is Kolmogorov-Smirnov with the help of SPSS. The hypothesis used in the normality test is H0 as sample test data that is normally distributed and H1 as sample test data that is not normally distributed, with the criteria in decision making a significant value of 0.05, ie if the significant value <0.05 then H0 is rejected, while if the significant value is > 0.05, then H0 accepted. If the analyzed data is normally distributed, then the data can be analyzed by homogeneity test, if the analyzed data is not normally distributed then the data will be analyzed using non-parametric test. The following are the results of the normality test of the pretest posttest presented in Table 6.

Table 6 Normality Test of Pre-posttest

Data	Pretest	Posttest	N
Control Class	0.048	0.014	30
Experimen Class	0.026	0.527	30

Based on the results of the normality test both have a significance level > 0.05 so it can be concluded the pretest and posttest were normally distributed and H_0 was accepted.

Homogenity Test

To see the variance of the pre-posttest same or not after the data is normally distributed, where the hypothesis used in the homogeneity test is H0, namely the sample test data varies the same or is homogeneous, while H1 is the sample test data varies unequally or heterogeneously. With the decision-making criteria using a significance level of 0.05, where if the significant value 0.05 then the data comes from a sample from a population that is not homogeneous, then H0 isrejected , whereas if the significant value is > 0.05 then the data comes from the sample comes from homogeneous population, then H0 accepted. The results of the homogeneity test analysis are presented in Table 7.

Table 7 Homogenity Test

Data	Lavene Statistic	df_1	df_2	df_3
Pretest	0.246	1	58	0.622
Posttest	1.019	1	58	0.317

Based on the significant value of the two sample data, the data is homogeneous so H_0 accepted.

Test The N-Gain

Calculation N aims to determine the increase in understanding of the concepts of experimental class and control class students after receiving treatment. The results of the calculation of the N-Gain pretest and posttest learning outcomes are presented in Table 8.

Table 8 Recapitulation N-Gain Pretest and Posttest Learning Outcomes

Class	Min	Maks	*N-Gain*	Criteria
Control Class	52	100	0.74	Medium
Experimen Class	52	85	0.55	High

Based on Table 8, it can be seen that there is a significant increase in students' cognitive abilities. Thus, it can be concluded that learning science with a scientific approach through digital literacy can improve the learning outcomes of fifth grade students with N-Gain which are included in the high category.

In addition to the results of observing student activities, the value of the implementation of learning is also obtained. Based on the results of data analysis on learning in the experimental class by applying digital literacy, an average of 73 was obtained, while learning in the control class by applying non-digital media was obtained an average of 54. The results of pretest and posttest conducted in the control and experimental classes resulted in an increase in learning outcomes. The average results of the control class in the medium category and the average experimental class in the high category. This is in line with research conducted by Jayanti (2017) which also reveals

that the science learning outcomes of students who follow the STM learning model are better than the science learning outcomes of students who follow the conventional learning model.

In line with research from Purnama (2016: 73) that research using mobile learning-based android can improve cognitive learning outcomes. The results obtained exceed the minimum passing criteria. In addition, there is research from Riduwan (2015: 9) research using mobile learning can improve student learning outcomes which is quite significant, seen from the difference between pretest and posttest. The process of preparing instruments and the process of preparing digital literacy are very helpful for the success of the data collection process. So that using digital literacy to get the final conclusion is valid, practical to use in learning and effective in improving students' cognitive abilities and activities.

Research from Andriani (2017: 276) in his research that cooperative learning can improve student learning outcomes. Because in learning between students can help each other, there is interaction between students through cooperative learning and the results affect the cognitive outcomes of Natural Science subjects. Science learning in the use of interactive multimedia can also improve digital literacy of earth structure materials and natural disasters (Nurcahyo, 2020).

CONCLUSION

The results of a questionnaire analysis of teacher needs for digital literacy by two respondents with the results of teachers strongly agreeing that there is complete digital literacy. The teacher needs analysis is realized in the media through the stages of validity testing by media experts with the results of 82,4 very good category. The application of the results of media validation produces learning activities with effective categories because it increases student activity in the learning process. And learning science with a scientific approach through digital literacy can improve the learning outcomes of fifth grade elementary school students. The increase was based on the average cognitive learning outcomes of experimental class students through the pretest with the results of 32,16 and the posttest with the results of 82.26.

REFERENCES

Andriyani, N. (2017). Pengaruh Metode Pembelajran Kooperatif dan Gaya Kognitif Terhadap Hasil Belajar IPA Siswa Kelas V Sekolah Dasar Negeri 147 Palembang.*Jurnal Pendidikan Dasar,* 6 (2): 276-286. Retrived from http://journal.unj.ac.id/unj/index.php/jpd/article/view/492

Ayatullah & Husnul, L. (2021). Implementasi Pendekatan Saintifik dalam Meningkakan Pemahaman Peserta Didik di MTs NW Senyiur. *Jurnal Pendidikan Islam Anak Usia Dini,* 3 (1): 127-141. Retrived from https://ejournal.stitpn.ac.id/index.php/assabiqun/article/view/1331/920

Firman, B., & Murtini, W. (2018). Pengembangan Modul Pelajaran Ekonomi Berbasis Saintifik untuk Meningkatkan Hasil Belajar Siswa SMA. *Jurnal Profesi Keguruan,* 5 (1): 6-11. Retrived from https://journal.unnes.ac.id/nju/index.php/jpk/article/view/12983

Chusniyah, I., Dewei, N.R & Pamelasari, S.D. (2016). Keedektifan Permainan Monopoli Berbasis Science Eduitnent Tema Tata Surya Terhadap Minat Belajar dan Karakter Ilmiah SIswa Kelas VIII. *Unnes Science Education Journal,* 5 (2): 1228-1239. Retrieved from https://journal.unnes.ac.id/sju/index.php/usej/article/view/12143

Deadara, E & Suyanto, S. (2017). Pengembangan Media Pembelajaran Sistem Reproduksi Manusia Berbasis Android untuk Meningkatkan Pemahaman Konsep Peserta Sisik. *Jurnal Prodi Pendidikan Biologi,* 6 (4): 198-210. Retrieved from

Ibda, F. (2015). Perkembangan Kognitif: Teori Jean Piaget. *INTELEKTUALITA*, 3 (1),

27-38. Retrieved from https://www.jurnal.ar-raniry.ac.id/index.php/intel/article/view/197/178

Jayanti, D., Arnyana, B., & Gunamantha, I.M. (2017). Pengaruh Model Pembelajaran Sains Teknologi Masyarakat Terhadap Hasil Belajar IPA Ditinjau dari Literasi Digital Siswa Kelas V Sekolah Dasar Gugus VI Kecamatan Mengwi. *Jurnal Pendidikan Dasar Indonesia*. 1 (2): 55-64. Retrieved from https://ejournal-pasca.undiksha.ac.id/index.php/jurnal_pendas/article/view/2681

JISC. (2017). Building digital capability. Retrieved from https://www.jisc.ac.uk/rd/projects/buildingdigitalcapability

Kadir, A. (2018). Kemampuan Koneksi Matematis Ditinjau dari *Self Concept* Siswa SMP dalam Model PBL Berpendekatan RME. *Primary of Education,* 6 (1): 9-13. Retrieved from https://ejournal.unsri.ac.id/index.php/jipf/article/view/10398/5085

Karar, E. E. & Yenice, N. (2012). The Investigation of Scientific Process Skill Level of Elementary Education 8th Grade Students in View of Demographic Features. *Procedia Social and Behavioral Sciences*, 46 (2012): 3885-3889. Retrieved from *https://www.sciencedirect.com/science/article/pii/S1877042812019027*

Mardina, R. (2011). Potensi Digital Native dalam Representasi Literasi Informasi Multimedia Berbasis Web di Perguruan Tinggi. *Jurnal Pustakawan Indonesia,* 11 (1): 5-14. Retrieved from http://journal.ipb.ac.id/index.php/jpi/article/view/5264

Martin, A. (2008). Digital Literacy and the "Digital Society." *Journal of Creative Education*, 8 (10): 151-176. Retrieved from https://pages.ucsd.edu/~bgoldfarb/comt109w10/reading/LankshearKnobel_et_al-DigitalLiteracies.pdf

Nurcahyo, A. N. (2020). Penggunaan Multimedia Interaktif untuk Meningkatkan Literasi Digital Siswa SMP pada Mata Pelajaran IPA. *Jurnal Pendidikan Informatika dan Sains,* 9 (2): hal 132-138. Retrieved from https://scholar.google.co.id/citations?view_op=view_citation&hl=id&user=ySgzmuMAAAAJ&citation_for_view=ySgzmuMAAAAJ:Tyk-4Ss8FVUC

Purnama, R.B. Sesunan, F & Ertikanto, C. (2016). Pengembangan Media Pembelajaran Mobile Learning Berbasis Android sebagai Suplemen Pembelajaran Fisika SMA pada Materi Usaha dan Energi. *Jurnal Pendidikan Fisika,* 5 (7): 65-74. Retrieved from http://jurnal.fkip.unila.ac.id/index.php/JPF/article/view/13650

Pratama, W. A., Hartini, S., & Misbah. (2019). Analisis Literasi Digital Siswa Melalui Penerapan E-Learning Berbasis Schoology. *Junal Inovasi dan Pembelajaran Fisika,* 6(1), 9-13. Retrieved from https://ejournal.unsri.ac.id/index.php/jipf/article/view/10398/5085

Prilianti, R. (2014). Keterampilan Proses Sebagai Penerapan Pendekatan Saintifik dalam Pembelajaran IPA. Semarang: Balai Diklat Keagamaan. Retrieved from https://scholar.google.co.id/citations?view_op=view_citation&hl=id&user=TUQCMXcAAAAJ&citation_for_view=TUQCMXcAAAAJ:u-x6o8ySG0sC

Rahma, S., Yuliati, L., & Irawan E.B. (2017). Penugasan Konsep IPA pada Siswa Sekolah Dasar. *Prosiding SEMNAS PS3DMP UML,* 3 (1), hal 35-39. Retrieved from https://rumahjurnal.net/index.php/PS2DMP/article/view/207

Rahman, A.Z. Hidayat, T. N & Yanuttama, I. (2017). Media Pembelajaran IPA Kelas III Sekolah Dasar Menggunakan Teknologi Augmented Reality Berbasis Android. *Jurnal Nasional Teknologi Informasi dan Multimedia,* 4 (6): 43-48. Retrieved from

https://ojs.amikom.ac.id/index.php/semnasteknomedia/article/view/1797/1519

Riduwan, K., Bachtiar, & Bahri. (2015). Pengembangan Media Mobile Learning Berbasis Android tentang Sistem Imun pada Mata Pelaaran Geografis Kelas XI di SMA Negeri 1 Bangsal Mojokerto. *Jurnal Pendidikan Nasional,* 2 (5): 11. Retrieved from https://jurnalmahasiswa.unesa.ac.id/index.php/jmtp/article/download/23508/21492

Rila, S., Abdullah, Prihantoro, E., & Hustinawaty. (2019). Model Penguatan Literasi Digital Melalui Pemanfaatan E-Learning". *Jurnal ASPIKOM,* 1200-1214. Retrieved from https://pdfs.semanticscholar.org/001b/5511ba9e7982e7fea856bab171d301da1adc.pdf

Septiary, D. & Sidabutar, M. (2020). Pelaksanaan Program Gerakan Literasi Sekolah (GLS) di SD Muhammadiyah Sokonandi. *Jurnal EPOSTEMA*, 1 (1): 1-11. Retrieved from https://journal.uny.ac.id/index.php/epistema/article/view/32054

Stefani, S.N.B. (2017). Literasi Digital dan Pembukaan Diri: Studi Korelasi Penggunaan Media Sosial pada Pelajar Remaja di Kota Medan. *Sosioglobal, Jurnal Pemikiran dan Penelitian Sosiologi,* 2 (1): 10-31. Retrieved from http://journal.unpad.ac.id/sosioglobal/article/view/15268

Subkhi, N., Ratnasari, A., & Hamidah. I. (2019). Pengembangan Alat Peraga Media Analog Sistem Peredaran Darah Berbahan Baku Limbah Lokal Indramayu. *Prosiding Seminar Matematika dan Sains,* 151-160. Retrieved from https://prosiding.biounwir.ac.id/article/download/24/22

Wina, D. R., Hindarto, N., & Prasetyo, A. P. B. (2017). Studi Kasus Pendekatan Saintifik dalam Pembelajaran IPA pada Kurikulum di SMP Negeri 5 Semarang. *Journal of Innovative Science Education,* 6 (1): 17-27. Retrieved from https://journal.unnes.ac.id/sju/index.php/jise/article/view/17045

Widyastuti, D. A. R., Nuswantoro, R., & Sidhi, T. A. P. (2016). Literasi Digital pada Perempuan Pelaku Usaha Produktif di Daerah Istimewa Yogyakarta". Jurnal ASPIKOM, 3 (1): 1-15. Retrieved from https://www.researchgate.net/publication/316263825_Literasi_Digital_pada_Perempuan_Pelaku_Usaha_Produktif_di_Daerah_Istimewa_Yogyakarta