JPII 11(1) (2022) 47-60

Jurnal Pendidikan IPA Indonesia

http://journal.unnes.ac.id/index.php/jpii

REVISED BLOOM TAXONOMY-ORIENTED LEARNING ACTIVITIES TO DEVELOP SCIENTIFIC LITERACY AND CREATIVE THINKING SKILLS

I G. N. Pujawan*[1], N. N. Rediani[2], I G. W. S. Antara[3], N. N. C. A. Putri[4], G. W. Bayu[5]

[1,2,3,4,5]Universitas Pendidikan Ganesha, Indonesia

DOI: 10.15294/jpii.v11i1.34628

Accepted: January 19th 2022. Approved: March 30th 2022. Published: March 31st 2022

ABSTRACT

Students' literacy and creative thinking skills in the learning process are not optimal. Students only master science concepts without communicating and solving problems in everyday life. It happens because the learning activities applied by the teacher are less innovative and varied. This study aims to analyze the impact of revised Bloom's Taxonomy-oriented learning activities on creative thinking skills and scientific literacy. The study had quasi-experimental in a pretest-posttest control group design. The sample of this study was 60 students; 30 students in the experimental class and 30 students in the control class. Data collection methods used were tests and questionnaires. The instrument used was a test instrument in description of 10 questions to test critical thinking skills, a questionnaire instrument consisting of 30 statements, and a questionnaire instrument to measure scientific literacy skills. Data analysis methods used were quantitative descriptive and inferential statistical. The Manova analysis obtained 0.00 < 0.05. Based on the analysis results, effective learning activities develop creative thinking skills and scientific literacy, either partially or simultaneously. Even though it affects creative thinking skills and scientific literacy, the strongly influenced variable is creative thinking skill, which is indicated by a significant increase in the mean value. Thus, learning activities based on Bloom's Taxonomy become learning recommendations to develop creative thinking skills and scientific literacy.

Keywords: creative thinking; knowledge of science; revised Bloom taxonomy; scientific literacy

INTRODUCTION

Learning is an activity that enables a systematic learning process and can be carried out in specific steps to achieve learning goals (Sutrisno & Siswanto, 2016; Nortvig et al., 2018). Students' quality of learning can be demonstrated by carrying out the learning process independently and actively, making learning meaningful. Meaningful learning will provide experiences that can be used in everyday life (Ratunguri, 2016; Bressington et al., 2018; Kostiainen et al., 2018). Learning is now experiencing a profound change, with face-to-face learning being substituted by online learning. Online learning is one of the lessons used as a solution during the COVID-19 pandemic (Patricia, 2020). Online learning occurs through the interaction of three elements: educator, cognitive, and social presence (Abe, 2020). Online learning supports more flexible learning (Dong et al., 2020). It provides students with easy and effective access to various information (O'Doherty et al., 2018). Online learning environments allow others to exchange ideas and promote independent learning (Hwang et al., 2020). Online learning will be effective if supported by participation, convenience in the learning process, time, and cost (Hussein et al., 2020). Several applications, such as WhatsApp, Zoom, web blog, and Edmodo, can assist the learning process (Handarini &

***Correspondence Address**
E-mail: ngurah.pujawan@undiksha.ac.id

Wulandari, 2020). Online learning demands outcomes that can compete in the 21st-century. To compete, students must have literacy skills. One of the required literacies is scientific literacy.

Scientific literacy is defined as the capacity to apply scientific knowledge and processes to comprehend scientific phenomena in problem-solving and decision-making (Widi et al., 2016; Sudarsono et al., 2020). The skill to interpret science in everyday life so that we may grasp the theory and discover answers to issues is referred to as scientific skill (Chusni & Hasanah, 2018; Samsu et al., 2020). The concept of scientific literacy is defined as knowledge of science and science-based technologies that aims to identify best answers to human issues (Asyhari, 2019; Rahmawati et al., 2020). Scientific literacy can utilize science, technology, and society through reasoning (Andriani et al., 2018). Students need to have scientific skills to answer various scientific questions that develop in society (Chusni & Hasanah, 2018). The concept of scientific literacy in its development supports the development of higher-order thinking skills (Asyhari & Putri, 2017). One of the higher-order thinking skills is also one that students must possess in the 21st century. 4C skills are mandatory to be taught at all levels of education, especially elementary school in the field of study and 21st-century themes (Fatmawati et al., 2019; Widodo et al., 2020). The same thing was also expressed by Redhana, that everyone must master 21st-century skills to succeed in facing challenges and problems in 21st-century life (Redhana, 2019). One of the skills that students must possess is creative thinking skills.

Creative thinking skill is a thinking process that can produce variety of viable responses (Sekar et al., 2015; Febrianti et al., 2016). Creative thinking is also a process used when an individual generates new ideas (Tendrita et al., 2016; Cintia et al., 2018; Maksum et al., 2021). Creative thinking includes much higher-order thinking skills such as analysis, testing, problem-solving, communication, and scientific process skills (Redifer et al., 2021; Yildiz & Guler Yildiz, 2021; Zhang et al., 2021). Creative thinking involves flexibility, fluency (Kassim et al., 2014; Huang et al., 2020), novelty, and elaboration (Hardy et al., 2017; Montag-Smit & Maertz, 2017). Thinking skills are divergent and convergent (Gu et al., 2019; Zhuang et al., 2021). Students with creative thinking skills learn to generate various ideas and viewpoints, to ask questions, to recognize the reality of others' views, and to be open and attentive to other perspectives (Akpur, 2020; Iskandar & Zulela, 2021; Redifer et al., 2021). It is essential to develop creative thinking skills in the learning process. Students' creative thinking skills in the learning process can affect their learning outcomes. Creative thinking skills that are well developed will impact learning outcomes (Fatmawati et al., 2019; Wulandari et al., 2019; Hidayatulloh et al., 2020). Students with high creative thinking skills will have good learning outcomes (Resien et al., 2020). The importance of creative thinking skills requires teachers to change the learning process. Creative and innovative learning will develop creative thinking skills and scientific literacy.

The reality that occurs in the field, the learning activities applied by the teacher lack innovation and varied creations, so learning is teacher-centered. The approach applied is still a conventional approach without thinking about the involvement of students in the learning process (Muntaha & Hartono, 2013). The teacher explains more in theory than the students do their activities. Students cannot participate actively during learning, so they have not been able to improve 5M skills, especially creative thinking in learning activities. In addition, students lack of opportunities to develop their thinking skills and a brave and confident attitude during learning. The low activeness of students in the learning resulted in their low learning outcomes. Developing students' creative thinking skills is one sign of achieving learning goals that can be applied in everyday life (Mahlianurrahman, 2017). In addition to these problems, another problem is the problem of scientific literacy. The average of students' scientific literacy is still not optimal, only in the ability to master content and have not been able to communicate and connect their abilities with everyday problems (Wibowo & Ariyatun, 2020). Scientific literacy of Indonesian students is underdeveloped, and the books that have been used so far have not trained students to understand the nature of science (Chusni & Hasanah, 2018). The low understanding of science concepts is often associated with learning activities that are still oriented to memorization (retention), learning methods that are still conventional, and the level of difficulty of the material learned by students (Ariana et al., 2020). So, it can be said that with learning that is not innovative, creative, and activity-based, students will lower their creative thinking skills and scientific literacy. If this happens, it will undoubtedly impact the education.

Innovative learning may be a solution for this problem. Several studies present innovative learning models to develop critical thinking skills and scientific literacy. Research states that local excellence-based learning can develop students' content, context, and science process skills (Nofiana & Julianto, 2018). The Brain-Based Learning model effectively increases students' scientific literacy (Saadah & Isnaeni, 2020). There is an increase in students' scientific literacy with project-based learning in science courses (Sakti et al., 2021). It is also stated that the guided inquiry learning strategy made a considerable difference in seventh-grade students' literacy skills on energy materials (Erdani et al., 2020). The guided inquiry learning model, enhanced by multimedia, has a beneficial impact on scientific literacy skill on substance material (Agustina et al., 2020). The correct implementation of creative problem-solving learning methods can develop creative thinking skills. There are differences in mathematical creative thinking skills between students who learn with problem-based models with a scientific approach and students who learn learning with a scientific approach (Nurqolbiah, 2016). Research results also state that the Problem-based Learning model effectively affects students' creative thinking skills (Fahrudin, 2017). So, innovative learning can develop creative thinking skills and scientific literacy. Based on this description, the learning carried out is a revised Bloom's Taxonomy -oriented learning activities.

Applying revised Bloom's Taxonomy-oriented learning activities, students can develop various skills in the learning process, including creative thinking skills and scientific literacy. Activity means everything done or activities carried out, both physical and non-physical (Lubis, 2011). Learning is a complex activity in which students are taught to accomplish stated aims through the teacher's conscious efforts (Setyorini & Rizqiana, 2017). So, a learning activity is an activity in the learning process that teaches students to achieve learning goals (Gugssa & Kabeta, 2021; Sailer et al., 2021). An effective learning activity is surely based on a strategy that allows learning objectives to be met best through Bloom's Taxonomy. Taxonomy is a framework to help teachers classify statements used to predict students' skills to learn due to the learning activities carried out (Darmawan & Sujoko, 2013; Adesoji, 2018; Magdalena et al., 2020). Revised Bloom's taxonomy in learning can greatly influence increasing students' knowledge, especially on knowledge of creative thinking skills and scientific literacy. The revised Bloom's Taxonomy-oriented learning activity is made to develop creative thinking skills and scientific literacy designed in innovative and varied ways. Learning activities driven by students' motivation means that they are aware to study seriously. The development of learning activities is designed to develop students' creative thinking skills in learning. Learning activities are developed according to the characteristics of students and refer to indicators from active learning theory, which makes students the center of learning. Students can be active and creative during learning through activities. The advantage of revised Bloom's Taxonomy-oriented learning activities to develop creative thinking skills is that it is carried out online, and there are varied, innovative, and student-centered learning activities.

This learning activity focuses on developing their creativity in learning. Therefore, this revised Bloom's Taxonomy-oriented learning activity needs to be applied to students to find out if the development of the revised Bloom's Taxonomy-oriented learning activity is effective or not on creative thinking skills and scientific literacy. This study aims to analyze the effect of revised Bloom's taxonomy-oriented learning activities on creative thinking skills and scientific literacy. Scientific literacy refers to 1) knowledge of science, 2) investigation of the nature of science, 3) science as a way of thinking, and 4) interaction of science, technology, and society. Meanwhile, the creative thinking skill in this research is the students' skills to solve the given problem concerning the creative thinking skill, which involves flexibility, fluency, novelty, and elaboration.

METHODS

This research used a quasi-experimental research design. This research design was quasi-experimental in the form of a pretest-posttest control group design (Rogers & Revesz, 2019). The experimental group was treated with online learning with revised Bloom’s Taxonomy-oriented learning activities oriented in carrying out the research. Meanwhile, the control group was treated by applying online learning. The experimental and control groups were given a pretest to find out the initial conditions before treatment, then a post-test to determine the difference in scientific literacy and creative thinking skill between the experimental group given the treatment. The data obtained in this study are (1) scientific literacy (Y_1) before treatment in the experimental class; (2) scientific literacy (Y_1) before treatment in the control class; (3) creative thinking skill (Y_2) before treatment in the experiment class; (4) creative thinking skill (Y_2) before treatment in the control class; (5) scientific literacy (Y_1) of students who learn with online learning with revised

Bloom's Taxonomy-oriented learning activities; (6) scientific literacy (Y_1) of students who learn with online learning; (7) creative thinking skill (Y_2) of students who learn with online learning with revised Bloom's taxonomy-oriented learning activities; and (8) creative thinking skill (Y_2) of students who learn with online learning. Fifth-grade students in Cluster 5, Buleleng District, was the research population. It consists of 6 schools with 135 students. The equivalence test was carried out using One Way-ANOVA (Anova-A) analysis using SPSS 25.0 for Windows. The sample of this study was 60 students; 30 fifth-grade students of SD Negeri 3 Kaliuntu as the experimental class and 30 fifth-grade students of SD Negeri 4 Kaliuntu as the control class. In determining the research sample, it used a random sampling technique.

In this study, the data collection process used was a test and questionnaire. The test method is used to indirectly determine the level of individual ability, which is carried out by responding to several stimuli or questions given (Evayanti & Sumantri, 2017). The test method was used to determine the effectiveness of Revised Bloom's Taxonomy-oriented learning activities on students' creative thinking skills. The instrument used is a test in description questions to measure the increase in students' creative thinking skills. Measuring the validity of an instrument can be done through several steps. The steps that can be done are: 1) making a content outline of test instruments, 2) making questions in the form of descriptions, 3) consulting the content outline. The test instruments designed were 12 items, but the tests given to students only amounted to 10 questions. The question content outline is described in Table 1. In the test of the validity of the creative thinking skill test instrument, it is necessary to test the validity of the instrument items, the validity of the content of the instrument, the reliability of the test, the level of difficulty of the test items, and the level of difficulty of the test equipment. Testing the validity of the instrument items of the creative thinking skill test was performed using the CVR formula. The CVR result from the calculation of each instrument item is 1, and the total CVR of all the items of the creative thinking skill test instrument is 16 and can be declared valid based on the validation provisions of each instrument item in the CVR formula. The test of the content validity of the creative thinking test instrument was carried out using the CVI formula with the results that the CVI value was 1 and the creative thinking skill test instrument was declared very good based on the provisions of the overall content validation of the instrument in the CVI formula. The creative thinking skill test's reliability test with data in the form of polytomies using the Alpha Coefficient formula with the results obtained is 0.80 and is in the range of $0.60 < r11 \leq 0.80$. So, the reliability of the creative thinking skill test is in high criteria. The level of difficulty of the creative thinking test items obtained the results that from the ten questions made, seven questions were in the medium criteria, and three questions were in the high criteria. In comparison, the level of difficulty of a test device is in the medium criteria.

Table 1. Indicators of Critical Thinking Skills in Ecosystems

No	Basic Competences	Indicators	Cognitive Level	Number of Questions
1	Analyze the relationship between ecosystem components and food webs in the surrounding environment	Infer the relationships between ecosystem components and food webs	C5	2
		Analyze the relationship between food webs and energy flows	C4	2
		Predict ecosystem conditions on human behavior	C5	2
2	Make work on the concept of food webs in an ecosystem	Create a food web in the marine ecosystem	C6	2
		Create a food web in the field ecosystem	C6	2

The questionnaire collection method was carried out to measure scientific literacy. The questionnaire consisted of 5 choices: strongly agree, agree, moderate, disagree, and strongly disagree. The number of instruments developed was 30, consisting of 4 dimensions developed into 15 indicators. The four dimensions are 1) knowledge of science, 2) investigation of the nature of science, 3) science as a way of thinking, and 4) interaction of science, technology, and society. A complete content outline is presented in Table 2. In testing the validity of the scientific literacy questionnaire instrument, it is necessary to test the validity of the instrument items, the validity of the instrument's content, and the reliability. Testing the validity of the contents of the questionnaire instrument used the CVR formula. The CVR result from the calculation of each instrument item is 1, and the total CVR of all scientific literacy skill instruments is 30 and can be declared valid based on the validation provisions of each instrument item in the CVR formula. Testing the validity of the contents of the questionnaire with SPSS, the result is 0.87. This value is classified as very strong. Testing the reliability of the questionnaire with SPSS obtained the results of the analysis with the value of Cronbach's Alpha with a value of 0.96, which means that the developed questionnaire is very reliable.

Table 2. Indicators of Scientific Literacies in Ecosystems

No	Dimensions	Indicators	Number of Statements
1	Knowledge of science	Explain facts, concepts, and laws related to ecosystems	2
		Present related hypotheses about ecosystems	2
		Answer statements about information related to ecosystems	2
2	Investigation of the nature of science	Answer ecosystem problems with material knowledge possessed or obtained	2
		Solve problems by describing solutions with tables, graphs, and others	2
		Make calculations related to energy flow ecosystem relationships	2
		Perform problem-solving with procedural steps	2
		Carry out problem-solving activities with experiments or thinking activities	2
3	Science as a way of thinking	Carry out experimental activities to solve the given problem	2
		Demonstrate thinking activities such as studying and analyzing ecosystem problems	2
		Carry out the process of analyzing the condition of the ecosystem with human behavior	2
		Demonstrate facts obtained from problem-solving activities	2
4	Interaction of science, technology, and society	Show concern for the environment due to the application of science	2
		Demonstrate the negative impact of science and technology on ecosystems	2
		Discuss ecosystem issues related to science and technology	2

The data analysis method of this research is descriptive analysis and inferential statistical analysis. The descriptive analysis carried out in this study was processed with SPSS 25.0 for Windows, and the data analyzed were pretest and post-test data. The values sought in the statistical test include the mean, standard deviation, maximum and minimum values. Meanwhile, inferential analysis was carried out in two ways: t-test for pretest data and inferential statistical analysis used with MANOVA test for post-test data. Before the t-test, the prerequisite tests for normality and homogeneity were conducted. The normality test used was Kolmogorov-Smirnov, while the homogeneity test used Levane Statistics. Similarly, prerequisite tests are performed before the Manova test. Prerequisite tests are the normality test with Kolmogorov-Smirnov, homogeneity test with Levene Statistic and Box's Test of Equality of Covariance Matrices, and linearity test aims to find out a linear relationship between each dependent variable analyzed. The MANOVA test and the prerequisite test were carried out with SPSS 25.0 for Windows.

RESULTS AND DISCUSSION

This study aims to analyze the effect of revised Bloom's Taxonomy-oriented learning activities on creative thinking skills and scientific literacy. In detail, the results of the descriptive analysis are described in Table 3. The results of the descriptive research show that there are differences in scientific literacy and creative thinking abilities. It can be shown that there is a difference in the mean score of the experimental class for scientific literacy skills of 2.23 and creative thinking skills of 2.00. Also, a significant average increase occurred in creative thinking skills before and after treatment with an increase in score of 4.97. Based on the analysis results, it can be said that the implementation of revised Bloom's Taxonomy-oriented learning activities has a positive effect on creative thinking skills and scientific literacy, and the most influenced variable is creative thinking skills. The next test was a prerequisite test for the pretest data group for scientific literacy data and creative thinking skills. The normality test results using the Kolmogorov Smirnov statistic show that the pretest data for both scientific literacy data and creative thinking skills were normally distributed (Sig. > 0.05) with a score of 0.19 for scientific literacy and 0.20 for creative thinking skills. The second prerequisite test carried out is the homogeneity test. The homogeneity test of scientific literacy data and creative thinking skills results from a homogeneous data group. With Sig. > 0.05, the value is 0.35 for scientific literacy and 0.93 for creative thinking skills. Based on the prerequisite test, both creative thinking skills and scientific literacy come from a normal and homogeneous distribution so that the independent t-test can be continued. The results of the t-test show a value (Sig.> 0.05) with a score of 0.31 for scientific literacy and 1.00 for creative thinking skills. This shows that both the experimental and control groups did not differ because of the sig value. > 0.05.

Table 3. Results of Descriptive Analysis of Creative Thinking Skills and Scientific Literacy

			Descriptive Statistics				
Treatments		**Variables**	**Means**	**Std. Deviations**	**Max**	**Min**	**N**
A1 Online learning with revised Bloom's Taxonomy oriented learning activities	Pre-test	Scientific Literacy	77.20	6.65	87	65	30
		Creative Thinking Skill	79.93	5.50	89	66	30
	Post-test	Scientific Literacy	83.20	6.65	98	71	30
		Creative Thinking Skill	84.90	5.55	94	71	30
A2 Online learning without the revised Bloom's Taxonomy oriented learning activities	Pre-test	Scientific Literacy	74.40	10.09	87	55	30
		Creative Thinking Skill	79.90	5.36	89	67	30
	Post-test	Scientific Literacy	80.97	7.01	93	68	30
		Creative Thinking Skill	82.90	6.41	94	71	30

The prerequisite tests of the analysis carried out include the normality test of data distribution, homogeneity of variance test, multivariate homogeneity test, and linearity test of the dependent variable. The analysis results show that all data come from groups of normally distributed data. The value of Sig can indicate this. > 0.05. The first prerequisite test was the normality test with the Kolmogorov-Smirnov. Table 4 displays the results of the normality test. The homogeneity test is the next required test once the normality test requirements are completed. It was performed using two analyses in this study: the homogeneity of variance test with Levine's Test of Equality and the multivariate homogeneity test with the Box's Test of Equality of Covariance Matrices. The analysis indicate that the study data is derived from homogenous data groups where the Sig. value is more than 0.05. The Sig. value of the homogeneity of variance test is 0.98 for scientific literacy and 0.99 for creative thinking skills. The multivariate homogeneity test got a Sig. value of 0.83 with an F value of 0.30. The next prerequisite test is the linearity test, which find out a linear relationship between the analyzed dependent variables. The results of the analysis show that the Sig. value on Deviation from Linearity of 0.91 (> 0.05). This means no linear relationship between the data on creative thinking skills and scientific literacy.

Table 4. The Results of Normality Analysis

Learning Approach		Kolmogorov-Smirnov[a]		
		Statistic	**df**	**Sig.**
Metacognitive skill	Online learning with the revised Bloom's Taxonomy oriented learning activities	0.11	30	0.20[*]
	Online learning without the revised Bloom's Taxonomy oriented learning activities	0.11	30	0.20[*]
Learning outcomes	Online learning with the revised Bloom's Taxonomy oriented learning activities	0.13	30	0.19
	Online learning without the revised Bloom's Taxonomy oriented learning activities	0.10	30	0.20[*]

The test conditions for MANOVA analysis have been met, where the research data obtained are normally distributed, homogeneous, and no linear relationship between variables so Manova hypothesis testing may be performed. The complete analysis results are described in Table 5 and Table 6.

Table 5. The Results of MANOVA Test

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	1.00	8072.666[b]	2.00	57.00	0.00	1.00
	Wilks' Lambda	0.00	8072.666[b]	2.00	57.00	0.00	1.00
	Hotelling's Trace	283.25	8072.666[b]	2.00	57.00	0.00	1.00
	Roy's Largest Root	283.25	8072.666[b]	2.00	57.00	0,00	1.00
Class	Pillai's Trace	0.05	1.622[b]	2.00	57.00	0.21	0.05
	Wilks' Lambda	0.95	1.622[b]	2.00	57.00	0.21	0.05
	Hotelling's Trace	0.06	1.622[b]	2.00	57.00	0.21	0.05
	Roy's Largest Root	0.06	1.622[b]	2.00	57.00	0.21	0.05

There are several findings based on Table 5 and Table 6. First, the MANOVA results show that the Pillae Trace, Wilks' Lambda Hotelling's Trace, and Roy's Largest Root indicate that the F coefficient is 8072.67[b] with a Sig value of 0.00. This means a simultaneous difference in scientific literacy and creative thinking skill between students who take online learning by implementing revised Bloom's Taxonomy-oriented learning activities and groups of students who take online learning without revised Bloom's taxonomy-oriented learning activities. Second, the Tests of Between-Subjects Effects analysis results show an F value of 1.60 with a Sig. value of 0.02, which is smaller than 0.05. This shows an effect of revised Bloom's taxonomy-oriented learning activities on scientific literacy skills. Third, the Tests of Between-Subjects Effects analysis results show an F value of 2.49 with a Sig. value of 0.01, which is smaller than 0.05. This shows an effect of revised Bloom's taxonomy-oriented learning activities on creative thinking skills.

Table 6. The Results of Between-Subjects Effects Test Analysis

Sources	Dependent Variables	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Scientific Literacy	74.82[a]	1	74.82	1.60	0.02	0.03
	Creative Thinking Skill	88.82[b]	1	88.82	2.49	0.01	0.04
Intercept	Scientific Literacy	404260.42	1	404260.42	8646.43	0.00	0.99
	Creative Thinking Skill	420508.82	1	420508.82	11785.98	0.00	1.00
class	Scientific Literacy	74.82	1	74.82	1.60	0.02	0.03
	Creative Thinking Skill	88.82	1	88.82	2.49	0.01	0.04
Error	Scientific Literacy	2711.77	58	46.76			
	Creative Thinking Skill	2069.37	58	35.68			
Total	Scientific Literacy	407047.00	60				
	Creative Thinking Skill	422667.00	60				
Corrected Total	Scientific Literacy	2786.58	59				
	Creative Thinking Skill	2158.18	59				

The results show that revised Bloom's Taxonomy-oriented learning activities could develop creative thinking skills and scientific literacy. The learning activities applied consist of 6 types of activities according to the cognitive and knowledge domains in the revised Bloom's Taxonomy. These activities are: 1) Analyze the relationship between ecosystem components and food webs in the surrounding environment; 2) Mention herbivores, carnivores, and omnivores; 3) Complete the chart with the classification of animals based on the type of food they eat; 4) Make a chart of animal classification based on the type of food; 5) Create a non-fiction text about classifying animals based on the type of food they eat; and 6) Make a non-fiction text about the chosen animal based on the type of food. These activities will focus on students' skills to solve the problems given in each activity. The activities are carried out to allow students to participate in the learning process. The learning activities applied are based on active learning theory, which emphasizes learner-centered learning (Nur Jannah, 2019). Active learning has indicators that can change the students' skills in learning. First, learning is student-centered. Student-centered learning can increase students' activeness in the learning process. With active students, the learning process becomes more meaningful.

Second, learning is based on clear goals. With clear learning objectives, the process followed by students becomes more focused, and the achievement of student competencies can also be measured. Third, active learning allows students to make discoveries related to the experience or knowledge they already have with new experiences offered by the teacher in the form of problems. With learning that invites students to make discoveries, the thinking power of students will increase. Students will also look for knowledge that is not yet known. Fourth, learning activities involve individual activities and social activities. The student-centered learning process can strengthen the interaction of students with other students, teachers, and the learning environment. This interaction will bring up new knowledge of students. Active learning can facilitate the emergence of life skills (Effendi, 2016). Active learning can allow students to demonstrate their skills in the learning process. Students' activeness in the learning process can increase social interactions, interactions between students and students, students and teachers, and students and the environment (Effendi, 2016). Through interaction in the learning process, students share their knowledge. Active learning can help teachers improve learners' quality (Mubayyinah & Ashari, 2017; Toha, 2018).

Based on this description, several findings are obtained in the research process. First, there is a simultaneous effect of students' creative thinking skills and scientific literacy taught online learning with revised Bloom's Taxonomy-oriented activities. This is indeed inseparable from the online learning activities that allow students to solve problems which can be applied in their daily lives. The online learning process with activities provides learning experiences for students to solve problems related to learning. This is inseparable from the activities carried out. The learning activities provided are problem-solving, simple experiments, and activities following students' cognitive development. This activity will certainly have an impact on scientific literacy skills. Scientific literacy is a person's ability to use knowledge and processes of science to understand scientific phenomena in problem-solving and decision-making (Widi et al., 2016; Sudarsono et al., 2020). The concept of scientific literacy refers to knowledge about science and science-based technology that seeks to find optimal solutions to human problems (Asyhari, 2019; Rahmawati et al., 2020). Scientific literacy is the ability to utilize science, technology, and society through reasoning (Andriani et al., 2018). Learning that allows students to solve problems actively can help them develop scientific literacy. The problem-solving process carried out by students allows students to gain experience in carrying out the steps of the scientific process.

The scientific process includes formulating problems, observing, reviewing, reporting, and communicating problem-solving results. To study and understand science as a whole and solve problems in everyday, the ability to process science is required (Hunaepi et al., 2020). Science process skills are basic skills that facilitate learning in science, make students active, foster a sense of responsibility, improve learning and research methods (Sunanto, 2021). Science process skills centered on student activities (Hikmawati et al., 2019) help students enter the culture of science so that learning science is not only accepting but trying to do science-seeking activities (Hardianti et al., 2020). Practicing science process skills in learning is one way to optimize student learning outcomes because by practicing science process skills, students will find their knowledge through experiments so that the subject matter will be easy to understand and remember in a relatively long time (Naj'iyah et al., 2020). The description illustrates that learning activities will provide opportunities for students to carry out scientific processes that certainly impact scientific literacy. The concept of scientific literacy in its development supports the development of higher-order thinking skills (Asyhari & Putri, 2017). One of the higher-order thinking skills is also one that students must possess in the 21st century. In this case, scientific literacy will impact creative thinking skills.

Good scientific literacy will have an impact on creative thinking skills. Someone who has scientific literacy can use scientific concepts and has scientific process skills to make everyday decisions when interacting with other people, society, and the environment (Ariana et al., 2020). Scientific literacy is the students' skills to recognize concepts, understand, explain, communicate science, apply science in everyday life (Arlis et al., 2020). Students with scientific literacy will have competitive performance (Nurhasanah et al., 2020). The competitive attitude of students will certainly make students try to solve problems in different ways according to the knowledge they have. This will develop their creative thinking skills. Creative thinking skill is a thinking process that can produce various possible answers (Sekar et al., 2015; Febrianti et al., 2016). Creative thinking is also used when an individual generates new ideas (Tendrita et al., 2016; Cintia et al., 2018). Creative thinking includes higher-order thinking skills such as analysis, testing, communication, problem-solving, and scientific process skills (Redifer et al., 2021; Yildiz & Guler, 2021; Zhang et al., 2021). Creative thinking involves flexibility, fluency (Kassim et al., 2014; Agustiana et al., 2020; Huang et al., 2020), novelty, and elaboration (Hardy et al., 2017; Montag-Smit & Maertz, 2017; Dwipayana et al., 2019). Thinking skills are divergent and convergent (Gu et al., 2019; Tri Agustiana et al., 2020; Zhuang et al., 2021). Creative thinking skills can train students to develop many ideas and opinions, ask questions, acknowledge the truth of opinions, and make students able to be open and responsive to different perspectives (Akpur, 2020; Redifer et al., 2021). So, good scientific literacy skills will impact creative thinking skills.

The second finding is an effect of revised Bloom's Taxonomy-oriented learning activities on scientific literacy. As discussed previously, learning activities will allow students to develop scientific process skills. With the development of the scientific process, students will provide science knowledge. In other words, the existence of students' skills to solve problems with the scientific process will impact scientific literacy skills. Scientific literacy is a person's skill to use knowledge and processes of science to understand scientific phenomena in solving problems and decision making (Widi et al., 2016; Sudarsono et al., 2020). Scientific skill is the skill to interpret science in everyday life to understand the theory and find solutions to the problems raised (Chusni & Hasanah, 2018; Samsu et al., 2020). The concept of scientific literacy refers to knowledge about science and science-based technology that seeks to find optimal solutions to human problems (Asyhari, 2019; Rahmawati et al., 2020). Scientific literacy is the ability to utilize science, technology, and society through reasoning (Andriani et al., 2018). Students need to have scientific abilities to answer various scientific questions that develop in society (Chusni & Hasanah, 2018). The concept of scientific literacy in its development supports the development of higher-order thinking skills (Asyhari & Putri, 2017). Students are expected to have the necessary skills: a) the ability to know and understand concepts and processes scientific needed to participate in society in the digital era, b) find answers, the ability to create and determine questions that arise from curiosity associated with experience every day, c) the ability to explain and predict phenomena, d) have conversation social, including the ability to read and understand scientific articles, e) able to identify problems in science and technology and information technology, f) have the ability to evaluate scientific information based on the sources and methods used, g) have the ability to draw conclusions and arguments and evaluate arguments based on evidence. To measure the level of basic science education, an evaluation of basic science education is needed (Kristyowati & Purwanto, 2019). So, scientific literacy skills can be increased with learning activities.

The third finding is a revised Bloom's Taxonomy-oriented learning activity on creative thinking skills. The implementation of learning activities is carried out on fourth-grade students. There is a difference in creative thinking skills in students who learn with revised Bloom's Taxonomy-oriented learning activities and groups of students who do not. Revised Bloom's Taxonomy-oriented learning activities allow students to be active and creative during learning. Revised Bloom's Taxonomy-oriented learning activities make student activities more focused according to their knowledge (Gunawan & Paluti, 2017; Netriwati, 2018). By applying revised Bloom's Taxonomy-oriented learning activities, students develop their knowledge. One of the knowledge areas that students must possess is creative thinking skills. In learning, creative thinking skill is also a supporter of the success of a learning process (Amtiningsih et al., 2016; Maftukhah et al., 2017).

In addition, the application of revised Bloom's Taxonomy-oriented learning activities also allow students to be active and interact during learning. The increase in students' skills in the learning process is obvious from the activities carried out by students during learning. This research focuses on developing the students' skills in the learning process. The application of revised Bloom's Taxonomy-oriented learning activities has a positive effect on increasing students' creative thinking skills. The revised Bloom's Taxonomy-oriented learning activity changes the teacher's method in the learning process. It changed from teacher-centered to student-centered learning. The teacher only acts as a facilitator and motivator to provide convenience or facilitate students in learning, and the teacher must also generate students' learning motivation. In the learning process, the teacher plays a role in encouraging and facilitating students (Kirom, 2017; Sumiati, 2018). The application of active learning is a teacher's solution to develop students' skills.

Meanwhile, conventional learning does not provide opportunities for students to be creative (Agustinawati, 2014; Ibrahim, 2017). The application of revised Bloom's Taxonomy-oriented learning activities can affect the development of students' skills. This is because learning activities are designed based on active learning theory. The advantages of revised Bloom's Taxonomy-oriented learning activities are: (1) student-centered learning activities; (2) learning activities invite students to find facts in learning; (3) learning activities are faced with a problem that students must solve; (4) learning activities can develop students' creative thinking skills, so that students have self-awareness in solving problems, and with this awareness, students can find out whether the completion process is correct and the extent of the truth and students can evaluate the location of the error in the solution; (5) learning activities are facilitated by appropriate, clear and relative learning media depending on the characteristics of students, materials, learning objectives; (6) learning activities invite students to interact socially; (7) learning activities develop students' cognitive and knowledge domains. With the implementation of this learning activity, students will become more active, creative, interact and develop their knowledge. Therefore, this learning activity can be applied in lower or higher classes by adjusting the learning material. The application of revised Bloom's Taxonomy-oriented learning activities is believed to develop students' cognitive skills and knowledge.

CONCLUSION

The revised Bloom's Taxonomy-oriented learning activities positively affect students' creative thinking skills and scientific literacy. This is indicated by the significant increase in scientific literacy and learning ability before and after treatment, and there is a difference in the average score between the group of students who were taught with the revised Bloom's Taxonomy-oriented learning activity and the group of students who were taught by online learning without revised Bloom's Taxonomy-oriented learning activity. The study results also show that learning activities based on revised Bloom's Taxonomy have more influence on creative thinking skills. This revised Bloom's Taxonomy-oriented learning activity has different advantages from other learning activities where it develops students' cognitive and knowledge domains and can be applied online. So, it is recommended as one of the learning innovations to develop creative thinking skills and scientific literacy.

REFERENCES

Abe, J. A. A. (2020). Big five, linguistic styles, and successful online learning. *Internet and Higher Education*, *45*(January), 100724.

Adesoji, F. A. (2018). Bloom Taxonomy Of Educational Objectives And The Modification Of Cognitive Levels. *Advances in Social Sciences Research Journal*, *5*(5).

Agustiana, I. G. A. T., Agustini, R., Ibrahim, M., & Tika, , I Nyoman. (2020). Perangkat Pembelajaran (RPS dan SAP) IPA Model (OPPEMEI) untuk Meningkatkan Keterampilan Berpikir Kreatif Mahasiswa PGSD. *Jurnal Ilmiah Sekolah Dasar*, *4*(2), 309.

Agustina, I. R., Andinasari, A., & Lia, L. (2020). Kemampuan Literasi Sains Pada Materi Zat Melalui Model Pembelajaran Inkuiri Terbimbing Berbantuan Multimedia. *Jurnal Pendidikan Fisika*, *8*(1), 1.

Agustinawati, N. (2014). *Pengaruh Metode Pembelajaran dan Kemandirian Belajar Terhadap Hasil Belajar Sejarah Siswa di SMAN 7 Cirebon*.

Akpur, U. (2020). Critical , Re fl ective , Creative Thinking and Their Reflections on Academic Achievement. *Thinking Skills and Creativity*, *37*(August).

Amtiningsih, S., Dwiastuti, S., & Puspita Sari, D. (2016). Peningkatan Kemampuan Berpikir Kreatif melalui Penerapan Guided Inquiry dipadu Brainstorming pada Materi Pencemaran Air. *Proceeding Biology Education Conference*, *13*(1), 868–872.

Andriani, N., Saparini, S., & Akhsan, H. (2018). Kemampuan Literasi Sains Fisika Siswa SMP Kelas VII Di Sumatera Selatan Menggunakan Kerangka PISA (Program for International Student Assesment). *Berkala Ilmiah Pendidikan Fisika*, *6*(3), 278.

Ariana, D., Situmorang, R. P., & Krave, A. S. (2020). Pengembangan Modul Berbasis Discovery Learning Pada Materi Jaringan Tumbuhan Untuk Meningkatkan Kemampuan Literasi Sains Siswa Kelas Xi Ipa Sma. *Jurnal Pendidikan Matematika Dan IPA*, *11*(1), 34.

Arlis, S., Amerta, S., Indrawati, T., Zuryanty, Z., Chandra, C., Hendri, S., Kharisma, A., & Fauziah, M. (2020). Literasi Sains Untuk Membangun Sikap Ilmiah Siswa Sekolah Dasar. *Jurnal Cakrawala Pendas*, *6*(1), 1–14.

Asyhari, A. (2019). Pengembangan instrumen asesmen literasi sains berbasis nilai-nilai islam dan budaya indonesia dengan pendekatan kontekstual. *Lentera Pendidikan*, *22*(1), 166–179.

Asyhari, A., & Putri, G. (2017). Pengaruh Pembelajaran Levels of Inquiry Terhadap Kemampuan Literasi Sains Siswa pembelajaran yang berorientasi inkuiri. *Scientae Educatia: Jurnal Pendidikan Sains*, *6*(2), 87–101.

Bressington, D. T., Wong, W. kit, Lam, K. K. C., & Chien, W. T. (2018). Concept mapping to promote meaningful learning, help relate theory to practice and improve learning self-efficacy in Asian mental health nursing students: A mixed-methods pilot study. *Nurse Education Today*, *60*(February 2017), 47–55.

Chusni, M. M., & Hasanah, A. (2018). Pengaruh Kemampuan Pengelolaan Laboratorium dan Literasi Sainfik Terhadap Kesiapan Calon Guru Fisika. *Berkala Ilmiah Pendidikan Fisika*, *6*(3), 325.

Cintia, N. I., Kristin, F., & Anugraheni, I. (2018). Penerapan Model Pembelajaran Discovery Learning Untuk Meningkatkan Kemampuan Berpikir Kreatif Dan Hasil Belajar Siswa. *Perspektif Ilmu Pendidikan*, *32*(1), 67–75.

Darmawan, I. P. A., & Sujoko, E. (2013). Revisi Taksonomi Pembelajaran Benyamin S. Bloom. *Satya Widya*, *29*(1), 30.

Dong, C., Cao, S., & Li, H. (2020). Young children's online learning during COVID-19 pandemic: Chinese parents' beliefs and attitudes. *Children and Youth Services Review*, *118*(August), 105440.

Dwipayana, I. K. A. A., Parmiti, D. P., & Diputra, K. S. (2019). Pengaruh Pendekatan Pendidikan Matematika Realistik Berbasis Open Ended Terhadap Kemampuan Berpikir Kreatif Siswa. *Journal of Education Technology*, *2*(3), 87.

Effendi, M. (2016). Integrasi Pembelajaran Active Learning dan Internet-Based Learning dalam Meningkatkan Keaktifan dan Kreativitas Belajar. *Nadwa*, *7*(2), 283.

Erdani, Y., Hakim, L., & Lia, L. (2020). Pengaruh Model Pembelajaran Inkuiri Terbimbing Terhadap Kemampuan Literasi Sains Siswa di SMP Negeri 35 Palembang. *Jurnal Pendidikan Fisika Dan Teknologi*, *6*(1), 45.

Fahrudin, F. A. (2017). Efektivitas Problem Based Learning Terhadap Kemampuan Berpikir Kreatif Mahasiswa Program Studi Tadris Matematika UIN Mataram. *JTAM | Jurnal Teori Dan Aplikasi Matematika*, *1*(1), 41.

Fatmawati, A., Zubaidah, S., Mahanal, S., & Sutopo. (2019). Critical Thinking, Creative Thinking, and Learning Achievement: How They are Related. *Journal of Physics: Conference Series*, *1417*(1).

Febrianti, Y., Djahir, Y., & Fatimah, S. (2016). Analisis Kemampuan Berpikir Kreatif Peserta Didik dengan Memanfaatkan Lingkungan pada Mata Pelajaran Ekonomi di SMA Negeri 6 Palembang. *Jurnal Profit*, *3*(1), 121–127.

Gu, X., Dijksterhuis, A., & Ritter, S. M. (2019). Fostering children's creative thinking skills with the 5-I training program. *Thinking Skills and Creativity*, *32*(March), 92–101.

Gugssa, M. A., & Kabeta, G. G. (2021). Instructors' workplace learning activities and inhibitors in Ethiopian higher learning institutions : Bahir Dar University in focus. *Social Sciences & Humanities Open*, *3*(1), 100106.

Handarini, O. I., & Wulandari, S. S. (2020). Daring to draw causal claims from non-randomized studies of primary care interventions. *Jurnal Pendidikan Administrasi Perkantoran (JPAP)*, *8*(3), 496–503.

Hardianti, T., Pohan, L. A., & Maulina, J. (2020). Bahan ajar berbasis saintifik: Pengaruhnya pada kemampuan berpikir kritis dan keterampilan proses sains siswa SMP An-Nizam. *JIPVA (Jurnal Pendidikan IPA Veteran)*, *4*(1), 81–92.

Hardy, J. H., Ness, A. M., & Mecca, J. (2017). Outside the box: Epistemic curiosity as a predictor of creative problem solving and creative performance. *Personality and Individual Differences*, *104*, 230–237.

Hidayatulloh, M. K. Y., Muslim, S., Rahmadyanti, E., Ismayati, E., & Kusumawati, N. (2020). Level of Creative Thinking Effect through Multiple Solution Task Type Problem-Solving On Learning Outcomes. *Journal of Education, Teaching, and Learning Volume*, *5*(1), 177–184.

Hikmawati, H., Kusmiyati, K., & Sutrio, S. (2019). Penerapan Lembar Kerja Eksperimen Untuk Melatih Keterampilan Proses Sains Siswa SMA. *Jurnal Pendidikan Fisika Dan Teknologi*, *5*(1), 167.

Huang, N., Chang, Y., & Chou, C. (2020). Effects of creative thinking , psychomotor skills , and creative self- e ffi cacy on engineering design creativity. *Thinking Skills and Creativity*, *37*(July), 100695.

Hunaepi, H., Susantini, E., Firdaus, L., Samsuri, T., & Raharjo, R. (2020). Analisis Keterampilan Proses Sains (Kps) Mahasiswa Melalui Kegiatan Praktikum Ekologi. *Edusains*, *12*(1), 98–105.

Hussein, E., Daoud, S., Alrabaiah, H., & Badawi, R. (2020). Exploring undergraduate students' attitudes towards emergency online learning during COVID-19: A case from the UAE. *Children and Youth Services Review*, *119*(August), 105699.

Hwang, G. J., Wang, S. Y., & Lai, C. L. (2020). Effects of a social regulation-based online learning framework on students' learning achievements and behaviors in mathematics. *Computers and Education*, *160*, 104031.

Ibrahim. (2017). Perpaduan Model Pembelajaran Aktif Konvensional (Ceramah) dengan Cooperatif (Make-a Match) untuk Meningkatkan Hasil Belajar Pendidikan Kewarganegaraan. *Jurnal Ilmu Pendidikan Sosial, Sains, Dan Humaniora*, *3*(2), 199–212.

Iskandar, R., & Zulela, M. S. (2021). Professionality Analysis of Basic Education Teachers As Agents To Improve Creativity in Digital Era. *Jurnal Ilmiah Sekolah Dasar*, *5*(1), 16-24.

Kassim, H., Nicholas, H., & Ng, W. (2014). Using a multimedia learning tool to improve creative performance. *Thinking Skills and Creativity*, *13*, 9–19.

Kirom, A. (2017). Peran Guru Dan Peserta Didik Dalam Proses Pembelajaran Berbasis Multikultural. *Al Murabbi*, *3*(1), 69–80.

Kostiainen, E., Ukskoski, T., Ruohotie-Lyhty, M., Kauppinen, M., Kainulainen, J., & Mäkinen, T. (2018). Meaningful learning in teacher education. *Teaching and Teacher Education*, *71*, 66–77.

Kristyowati, R., & Purwanto, A. (2019). Pembelajaran Literasi Sains Melalui Pemanfaatan Lingkungan. *Scholaria: Jurnal Pendidikan Dan Kebudayaan*, *9*(2), 183–191.

Lubis, K. M. (2011). Peningkatan Aktivitas Pembelajaran Hidrosfer Dan Dampaknya Terhadap Kehidupan Melalui Tindakan Guru Inovatif Pada Kelas X Di Sma Negeri 1 Semarang. *Jurnal Geografi*, *8*(2), 189–202.

Maftukhah, N. A., Nurhalim, K., Dasar, P. P., & Semarang, U. N. (2017). Kemampuan Berpikir Kreatif dalam Pembelajaran Model Connecting Organizing Reflecting Extending Ditinjau dari Kecerdasan Emosional. *Journal of Primary Education*, *6*(3), 267–276.

Magdalena, I., Islami, nur fajriyati, Rasid, eva alanda, & Diasty, nadia tasya. (2020). Tiga Ranah Taksonomi Bloom Dalam Pendidikan. *Jurnal Edukasi Dan Sains*, *2*(1), 132–139.

Mahlianurrahman, M. (2017). Pengembangan Perangkat Pembelajaran untuk Meningkatkan Kemampuan Berpikir Kreatif Siswa Sekolah Dasar. *AR-RIAYAH : Jurnal Pendidikan Dasar*, *1*(1), 87.

Maksum, A., Wayan Widiana, I., & Marini, A. (2021). Path analysis of self-regulation, social skills, critical thinking and problem-solving ability on social studies learning outcomes. *International Journal of Instruction*, *14*(3), 613–628.

Montag-Smit, T., & Maertz, C. P. (2017). Searching outside the box in creative problem solving: The role of creative thinking skills and domain knowledge. *Journal of Business Research*, *81*(July), 1–10.

Mubayyinah, N., & Ashari, M. Y. (2017). Efektivitas Metode Active Learning dalam Meningkatkan Hasil Belajar Pendidikan Agama Islam Siswa Kelas X-A di SMA Darul Ulum 3 Peterongan Jombang. *Jurnal Pendidikan Islam*, *1*(1), 75–93.

Muntaha, A., & Hartono. (2013). Pengembangan Perangkat Model Problem Based Learning Untuk Meningkatkan kemampua berpikir kreatif. *Journal of Primary Educational*, *2*(2).

Naj'iyah, A. L., Suyatna, A., & Abdurrahman, A. (2020). Modul Interaktif Efek Fotolistrik Berbasis Lcds Untuk Menstimulus Kemampuan Berpikir Kritis Dan Keterampilan Proses Sains. *Jurnal Pendidikan Fisika*, *8*(1), 79.

Nofiana, M., & Julianto, T. (2018). Upaya Peningkatan Literasi Sains Siswa Melalui Pembelajaran Berbasis Keunggulan Lokal. *Biosfer : Jurnal Tadris Biologi*, *9*(1), 24.

Nortvig, A. M., Petersen, A. K., & Balle, S. H. (2018). A literature review of the factors influencing e-learning and blended learning in relation to learning outcome, student satisfaction and engagement. *Electronic Journal of E-Learning*, *16*(1), 45–55.

Nur Jannah, E. S. (2019). Penerapan Metode Pembelajaran "Active Learning-Small Group Discussion" di Perguruan Tinggi Sebagai Upaya Peningkatan Proses Pembelajaran. *Fondatia*, *3*(2), 19–34.

Nurhasanah, N., Jumadi, J., Herliandry, L. D., Zahra, M., & Suban, M. E. (2020). Perkembangan Penelitian Literasi Sains Dalam Pembelajaran Fisika Di Indonesia. *Edusains*, *12*(1), 38–46.

Nurqolbiah, S. (2016). Peningkatan kemampuan pemecahan masalah, berpikir kreatif dan self-confidence siswa melalui model pembelajaran berbasis masalah. *Jurnal Penelitian Pendidikan Dan Pengajaran Matematika*, *2*(2), 143–158.

O'Doherty, D., Dromey, M., Lougheed, J., Hannigan, A., Last, J., & McGrath1, D. (2018). Barriers and solutions to online learning in medical education – an integrative review. *BMC Medical Education*, *18*(130), 1–11.

Patricia, A. (2020). College Students' Use and Acceptance of Emergency Online Learning Due to COVID-19. *International Journal of Educational Research Open*, 100011.

Rahmawati, Y., Ridwan, A., Faustine, S., Syarah, S., Ibrahim, I., & Mawarni, P. C. (2020). Pengembangan Literasi Sains Dan Identitas Budaya Siswa Melalui Pendekatan Etno-Pedagogi Dalam Pembelajaran Sains. *Edusains*, *12*(1), 54–63.

Ratunguri, Y. (2016). Implementasi Metode Pembelajaran Eksperimen untuk Meningkatkan Keterampilan Proses Sains Mahasiswa PGSD. *PEDAGOGIA: Jurnal Pendidikan*, *5*(2), 137.

Redhana, I. W. (2019). Mengembangkan Keterampilan Abad Ke-21 Dalam Pembelajaran Kimia. *Jurnal Inovasi Pendidikan Kimia*, *13*(1).

Redifer, J. L., Bae, C. L., & Zhao, Q. (2021). Self-efficacy and performance feedback : Impacts on cognitive load during creative thinking. *Learning and Instruction*, *71*(february 2021), 101395.

Resien, R., Sitompul, H., & Situmorang, J. (2020). The Effect of Blended Learning Strategy and Creative Thinking of Students on the Results of Learning Information and Communication Technology by Controlling Initial Knowledge. *Budapest International Research and Critics in Linguistics and Education (BirLE) Journal*, *3*(2), 879–893.

Rogers, J., & Revesz, A. (2019). Experimental and Quasi-Experimental. *ResearchGate*, *July*, 133–143.

Saadah, K., & Isnaeni, W. (2020). Peran Model Brain-Based Learning Pada Pembelajaran Sistem Saraf Dalam Meningkatan Literasi Sains Siswa. *Phenomenon : Jurnal Pendidikan MIPA*, *9*(2), 132–149.

Sailer, M., Schultz-pernice, F., & Fischer, F. (2021). Contextual facilitators for learning activities involving technology in higher education : The C♭ -model. *Computers in Human Behavior*, *121*(October 2020), 106794.

Sakti, I., Nirwan, & Swistoro, E. (2021). Penerapan Model Project Based Learning untuk Meningkatkan Literasi Sains Mahasiswa Pendidikan IPA. *Jurnal Kumparan Fisika*, *4*(1), 35–42.

Samsu, N., Mustika, D., Nafaida, R., & Manurung, N. (2020). Analisis Kelayakan dan Kepraktisan Modul Praktikum Berbasis Literasi Sains untuk Pembelajaran IPA. *Jurnal IPA & Pembelajaran IPA*, *4*(1), 29–40.

Sekar, D. K. S., Pudjawan, K., & Margunayasa, I. G. (2015). Pembelajaran Ipa Pada Siswa Kelas Iv Universitas Pendidikan Ganesha. *E-Journal PGSD Universitas Pendidikan Ganesha Jurusan PGSD*, *3*(1), 1–11.

Setyorini, N., & Rizqiana, S. (2017). *Keefektifan Media Artikel Dalam Pembelajaran Menulis Naskah Pidato*. *2*(2), 137–144.

Sudarsono, S., Abdurrahman, A., & Rosidin, U. (2020). Pengembangan Cerita Bergambar Fisika Berbasis STEM untuk Menumbuhkan Literasi Sains pada Siswa SMP. *Jurnal Pendidikan Fisika*, *8*(1), 11.

Sumiati, S. (2018). Peranan Guru Kelas Dalam Meningkatkan Motivasi Belajar Siswa. *TARBAWI : Jurnal Pendidikan Agama Islam*, *3*(02), 145–164.

Sunanto, L. (2021). Efektivitas Perangkat Pembelajaran Berbasis Keterampilan Proses untuk Meningkatkan Hasil Belajar Sains Siswa Sekolah Dasar. *Jurnal Cakrawala Pendas*, *7*(2), 243–249.

Sutrisno, V. L. P., & Siswanto, B. T. (2016). Faktor-Faktor Yang Mempengaruhi Hasil Belajar Siswa Pada Pembelajaran Praktik Kelistrikan Otomotif Smk Di Kota Yogyakarta. *Jurnal Pendidikan Vokasi*, *6*(1), 111.

Tendrita, M., Mahanal, S., & Zubaidah, S. (2016). Pemberdayaan Keterampilan Berpikir Kreatif melalui Model Remap Think Pair Share. *Proceeding Biology Education Conference (ISSN: 2528-5742)*, *13*(1), 285–291.

Toha, S. M. (2018). Pelaksanaan Metode Active Learning dalam Meningkatkan Hasil Belajar Siswa pada Pembelajaran Pendidikan Agama Islam. *Ta'dibuna: Jurnal Pendidikan Islam*, *7*(1), 79.

Tri Agustiana, I. G. A., Agustini, R., Ibrahim, M., & Tika, I. N. (2020). Efektivitas Model OPPEMEI untuk Meningkatkan Kemampuan Berpikir Kreatif Mahasiswa. *Journal of Education Technology*, *4*(2), 150.

Wibowo, T., & Ariyatun, A. (2020). Kemampuan Literasi Sains Pada Siswa Sma Menggunakan Pembelajaran Kimia Berbasis Etnosains. *Edusains*, *12*(2), 214–222.

Widi, cIlhami N., Setiya, U., & Duden, S. (2016). Penerapan Scientific Approach untuk Meningkatkan Literasi Saintifik dalam Domain Kompetensi Siswa SMP pada Topik Kalor. *Jurnal Penelitian & Pengembangan Pendidikan Fisika*, *2*(1), 51–56.

Widodo, A., Indraswati, D., Sutisna, D., Nursaptini, & Anar, A. P. (2020). Pendidikan IPS Menjawab Tantangan Abad 21 : Sebuah Kritik Atas Praktik Pembelajaran IPS di Sekolah Dasar dikuasai siswa dalam menghadapi abad 21 hanyalah kemampuan terhadap teknologi dan. *Jurnal Pendidikan Ilmu Pengetahuan Sosial Dan Ilmu-Ilmu Sosial*, *2*(2), 186–198.

Wulandari, F. A., Mawardi, M., & Wardani, K. W. (2019). Peningkatan Keterampilan Berpikir Kreatif Siswa Kelas 5 Menggunakan Model Mind Mapping. *Jurnal Ilmiah Sekolah Dasar*, *3*(1), 10.

Yildiz, C., & Guler Yildiz, T. (2021). Exploring the Relationship between Creative Thinking and Scientific Process Skills of Preschool Children. *Thinking Skills and Creativity*, *39*(January), 100795.

Zhang, M., Guo, M., & Xiao, B. (2021). Creative thinking and musical collaboration: Promoting online learning groups for aspiring musicians. *Thinking Skills and Creativity*, *42*, 100947.

Zhuang, K., Yang, W., Li, Y., Zhang, J., Chen, Q., Meng, J., Wei, D., Sun, J., He, L., Mao, Y., Wang, X., Vatansever, D., & Qiu, J. (2021). Connectome-based Evidence for Creative Thinking as an Emergent Property of Ordinary Cognitive Operations. *NeuroImage*, *227*(December), 1–15.