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Research Article

Effectiveness of Problem-Based Integrative Thematic Learning Modules to Improve the Learning Outcomes of Elementary School Students

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Abstract
This research is quasi-experimental research with quantifiable approach, where this research focuses on the effectiveness of integrative thematic learning modules based on problem-based learning to improve the learning independence of elementary school students. This research was conducted at SDN 1 Sape and SDN 2 Sape in Bima Regency, NTB. This study used 2 samples, a sample of experimentation, namely VA and VD classes, which each numbered 29 students. As for the control sample, the VC class consists of 31 students. Data collection techniques in this study using the technique. giving tests. The results of interviews and observations are analyzed using descriptive techniques for the purposes of preliminary data supporting research. Analysis of improved learning independence with standard gain techniques. In cognitive study results for both classes the experiment had a significance of $p<0.05$ based on independent t-test and paired sample t-test. In addition, the results of the va experiment class cognitive learning results had a posttest score of 81.03 with a completion of 89.65% and in the experiment class VD had a posttest score of 79.65 with a completion of 82.75%.

Introduction

Learning is a process or eff ort made by each individual to obtain a change in behavior in the form of knowledge, skills and positive attitudes and values as an experience to get some impression of the material that has been studied (Wahab, Mahmud, & Tiro, 2018). Learning Outcomes is one of the benchmarks of successful learning objectives that have been implemented. Learning outcomes are measured based on learning objectives based on three areas, namely the cognitive realm of focus on knowledge, the affective realm focusing on feelings and interests and the psychomotor realm focusing on motion skills and perception processes (Yastika & Haryanto, 2016). Learning outcomes are related to the learning objectives that want to be achieved in the learning process so that the learning objectives have 3 areas, namely cognitive, affective, and psychomotor. As Miller (2008) explains, "objectives are classified into three learning domains: (1) affective, cognitive, and (3) psychomotor. Each learning domain has levels or subdivisions that require increasingly more complex student behaviors". The purpose of the learning outcomes is divided into 3 domain domains, namely affective, cognitive and psychomotor.

Another opinion was expressed by Keshavarz (2011) who explained that, "Learning outcomes focus on the measurable cognitive, behavioral and attitudinal development of students as they interact with a learning activity." Based on this opinion, it can be known if students who are able to develop their manners are also included in the benchmark of learning success.

In addition, the results of learning are not only about the knowledge gained by students but the way students act and do from the knowledge they gain. Anderson and Krathwohl (2001) states that students succeed in learning if they are able to understand the material and use their knowledge to solve new problems and learn new situations. Learning outcomes can be in the form of knowledge that has been obtained by students through the learning carried out, able to equip students to think and act in solving problems in daily life. The learning outcomes of all things that can be used as indicators affect the value of the use of learning strategies under different situations Degeng in (Andrini, 2016). Learning outcomes can not always be shown by students to the extent of value in the knowledge gained but also skills and attitudes so as to produce changes in behavior.

Changes in student behavior become one of the indicators of learning outcomes, because these changes are based on the achievement of students' understanding of a particular material. Ebel and Frisbie (1991) "Some specific learning outcomes can be developed that indicate the kind of behaviors we are willing to accept as evidence for attainment of the general learning outcome". Learning outcomes can be known after students have done the learning process in the classroom. Another opinion was expressed by Kurniawati, Wahyuni, and Putra (2017) who explained that the results of learning are accumulated from three domains such as affective (spiritual and scientific behavior), cognitive and psychomotor (scientific work). Learning outcomes are more directed to the three cognitive, affective and psychomotor spheres that students gain during learning. As explained by Kunandar (2014) that learning outcomes are certain competencies or abilities both cognitive, affective and psychomotor achieved or mastered by students after following the teaching process. Students' learning outcomes are based on the learning process that has been done so that students are able to apply the knowledge they already have to their daily lives.

Similarly, it was also stated in Permendikbud Year 2016 No 23 on Assessment Standards which explains that assessments for student learning outcomes in primary and secondary education include aspects of attitude, knowledge and skills. The learning results based on curriculum 2013 cover all three areas, namely aspects of attitude, knowledge and skills.

Based on some of these opinions, it can be synthesized the results of the study studied in this study based on the opinion of Kunandar and Permendikbud Year 2016 No. 23 on Assessment Standards. Learning outcomes are competencies or abilities including cognitive, affective and psychomotor that students achieve or master after following the learning process. Learning outcomes in the cognitive realm are learning outcomes related to knowledge. While in the realm of affection, learning outcomes are related to student attitudes. For the realm of psychomotor related to the movement of students. The following is explained from the three areas of learning outcomes.

Problem Based Learning learning model is one of the models of constructivist learning theory that facilitates students to actively solve problems through problem giving. Akcay (2009) explains that, "Constructivism concentrates on learning how to think and understand. Students also use their knowledge to solve real problems because constructivist learning is transferable". In constructivist learning, students are faced with the context of problems that occur in real life so that students are able to manage the information they have and receive to solve problems.

Problem Based Learning learning model is one of the models of constructivist learning theory that facilitates students to actively solve problems through problem giving. Akcay (2009) explains that, "Constructivism concentrates on learning how to think and understand. Students also use their knowledge to solve real problems because constructivist learning is transferable". In constructivist learning, students are faced with the context of problems that occur in real life so that students are able to manage the information they have and receive to solve problems. The PBL model bases its learning steps in accordance with the principles of constructivist theory which is to encourage students to construct their knowledge through problems that occur in real life.

Through PBL, students explore important concepts and principles in a particular material through the issues presented so that it is important for teachers to present the right problems. The use of PBL is based on a proper set of issues to help students acquire substantial knowledge, deepen understanding of important concepts and principles and develop skills relevant to a student's future career (Killen, 2009). Problems become an emphasis on PBL learning so that the problems studied are real complex problems in everyday life.

Student-centered learning is the key to pbl implementation. Arends and Kilcher (2010) explain the PBL is, "A student-centered approach that organizes curriculum and instruction around carefully crafted "ill-structures" and real-world problem situations. The PBL model is a learning model that requires students to actively solve problems, collect data related to problems and find solutions. The same was also stated by Demirel and Dağyar (2016) explaining that, "PBL is a student-oriented approach; it gives problem solving skills to students in addition to teaching basic knowledge consisting of real situations." The PBL model includes a student-centered model through the delivery of real-life learning. Arends (2012) also stated "Problem Based Learning lessons are organized around real-life situations that evade simple answers and invite competing solutions". The presentation of problems in pbl focuses on the real world, making it easier for students to collect relevant data and information and solve problems.

The PBL model is a student-centered learning model that presents problems in everyday life and encourages students to solve problems. Leary (2012) explains that students in PBL learning actively build knowledge according to learning objectives, students also seek information to increase initial knowledge and improve students' understanding of problems, students also assess the learning process and actively participate with other students. Learning using the PBL model encourages students to be actively involved in the learning process, especially when it comes to finding information, discussing and solving problems.

Based on some of the opinions above synthesized Problem Based Learning model is a learning model that presents problems with topics related to real life students so as to encourage students to actively develop problem solving skills and deepen understanding of learning concepts. Mastery of important concepts and principles helps students to develop skills relevant to future careers.

Integrative thematic modules as companion teaching materials from existing student handbooks. This integrative thematic module is based on Problem Based Learning (PBL) model, Problem Based Learning (PBL) model is one of the models applied in curriculum 2013 to facilitate students learning. Integrative thematic modules based on the Problem Based Learning (PBL) model have not been developed to facilitate student learning. The development of integrative thematic module

teaching materials is based on weaknesses in the student handbook so that the learning is not in accordance with the implementation of curriculum 2013. As explained by Prastowo (2015) that the quality of learning becomes low when educators are only fixated on conventional materials without any creativity to develop these teaching materials innovatively. Learning using modules encourages students' learning independence in learning so that students can actively learn on their own and teachers only act as facilitators.

While the Problem Based Learning (PBL) model facilitates students to be actively involved in the learning process with various activities such as investigation, problem solving, linking the data obtained and drawing conclusions. Arends and Kilcher (2010) explains "... teachers coax and prompt students; they provide feedback and encourage students to become independent and self-reliant learners."In this model the teacher will act as a facilitator that provides a problem to the students so that later students will try to construct the knowledge needed to solve the problem independently.

PBL encourages students to be actively involved directly in learning. Schunk (2012) explains, "Students who believe that learning outcomes are under their control may expend greater mental effort, rehearse more, use organizational strategies, and employ other tactics to improve learning". Problem Based Learning model builds student character through investigations that are packaged in problems that commonly occur in students' daily lives. Through integrative thematic modules based on Problem Based Learning, students are expected to be able to increase their independence and learning outcomes covering three areas, namely cognitive, affective and psychomotor. Based on the background description, the study is titled "Effectiveness of Problem Based Integrative Thematic Learning Modules to Improve The Learning Outcomes of Elementary School Students".

Research Method

This research is quasi-experimental research with quantitative approach. There are three classes used for this study, namely two classes as experimental group classes and one class as control group classes. The experimental group was conducted in the VA and VD classes of SDN 1 Sape and SDN 2 Sape in Bima District, NTB, which numbered 29 each. While the control class group is VC class students a total of 31 students. In addition, there are three va, VC, and VD class teachers as implementers of learning. The selection of VA, VC, and VD classes as classes used for research because the three classes have relatively similar student characteristics and learning outcomes based on observations and interviews that have previously been conducted.

Data collection techniques in this study use test-giving techniques, and where the data collection techniques are carried out using instruments that have met valid and reliable criteria, as well as with test instruments that meet the standards of good instrument characteristics. In this study the interview was used as a material used to background the research. Borg and Gall (1984) and Gall, Borg, and Gall (1996) explains that "Interviews consist of oral wuestions asked by the interviewer and oral responses by the research participants".

Preliminary data before the implementation of this study, in the form of interview results and observation data on learning. The results of interviews and observations are analyzed using descriptive techniques for the purposes of preliminary data supporting research. Then the analysis is carried out on the results of self-reliance scale data and the results of observation of learning independence which is then on the score on each indicator calculated mean average score. After that, then the score is categorized into values with five scale criteria with the category of choice that is very good (5), good (4), less good (3), good (2), very less good (1). According to Sukarjo (2006), the score obtained is then converted into qualitative data scale five, with the formula in table 1 follows.

Table 1.
Average scoring interval conversion

Value	Score Interval	Category
A	$X > X_i + 1{,}8\ SB_i$	Excellent
B	$X_i + 0{,}6\ SB_i < X \leq X_i + 1{,}8\ SB_i$	Good
C	$X_i - 0{,}6\ SB_i < X \leq X_i + 0{,}6\ SB_i$	Enough
D	$X_i - 1{,}8\ SB_i < X \leq X_i - 0{,}6\ SB_i$	Less
E	$X \leq X_i - 1{,}8\ SB_i$	Poor

After categorizing the results, then continued with the analysis techniques of improving learning independence with standard gain techniques. Furthermore, it is continued with the analysis of data testing the effectiveness of self-reliance with the help of the SPSS program.

Research Results

1. Student Learning Outcomes Data (Cognitive)

Data on cognitive learning outcomes were obtained from tests on 31 VC graders, 29 VA graders and 29 VD graders. Data on cognitive learning outcomes conducted before (pre) and after (post) all learning is done. The data obtained from the learning outcomes in the control class can be outlined in Table 2.

Table 2.
Student learning outcomes (Cognitive)

Class	*Pretest* Average	Percentage of Completion *Pretest* (%)		*Posttest* Average	Percentage of Completion *Posttest* (%)	
		Complate	Unfinished		Complate	Unfinished
Control	59,90	16,12	83,87	73,54	74,19	29,03
Eksperimen VA	59,77	20,68	79,31	81,03	89,65	10,34
Eksperimen VD	59,88	20,68	79,31	79,65	82,75	17,24

Based on Table 2, it can be known if the results of the third pretest class have a completion percentage below 75%. In the pretest the results of the control class had an average score of 59.90, the experiment class 1 had an average score of 59.77, and the experimental class 2 had an average score of 59.88. While in the post test cognitive learning results had an increase in scores especially in the entire experimental class that had a percentage of completion above 75%. Posttest study results in the control class had an average score of 73.54, experiment class 1 had a score of 81.03 and experiment class 2 had an average score of 79.65.

2. Test the Effectiveness of Student Learning Outcomes Cognitive Aspects

These learning outcome variables are measured in three areas, namely cognitive learning outcomes. For data on the results of learning the cognitive realm obtained test questions given before and after learning the sub-theme "Environmental Conservation Efforts".

a) Results of learning cognitive aspects

1) Standard gain score improved learning outcomes

Analysis of calculations of improved cognitive learning outcomes using gain score. Score gain is used to determine the increase in pretest and posttest scores on cognitive learning outcomes. Based on the calculation of the standard gain shown in Table 3.

Table 3.
Standard gain score of learning outcomes

No	Class	Standard Gain Score
1	Control Class	0,34
2	Experimental Class (VA)	0,53
3	Experimental Class (VD)	0,49

Based on these tables it can be known if the standard gain score of the experiment class is higher than the control class. This proves that the use of PBL-based integrative thematic learning modules is able to improve cognitive learning outcomes higher than the use of student books in control classes.

1) Normality test

Testing the normality of cognitive learning results data using kolmogorov Smirnov test using SPSS 16.0 program. The following are directed at the results of the normality test of learning independence in the control class, experiment 1 and experiment 2 in Table 4.

Table 4.
Test the normality of cognitive learning outcomes

Class	Data	Signifikansi (p)	Condition	Description
Control	*Pretest*	0,200	p > 0,05	Normal
	Posttest	0,156	p > 0,05	Normal
Experimental VA	*Pretest*	0,142	p > 0,05	Normal
	Posttest	0,200	p > 0,05	Normal
Experimental VD	*Pretest*	0,166	p > 0,05	Normal
	Posttest	0,165	p > 0,05	Normal

Based on Table 50, the data of normality test calculation results on control class pretest data obtained significance of 0.200 and posttest significance of 0.200. While in the experimental class (VA) the significance of pretest data obtained 0.142 and the significance of posttest data 0.117, as well as in the experimental class (VD) obtained pretest data with a significance of 0.166 and posttest data significance of 0.200. Data is called normal distribution if p>0.05. Since all data has a significance of more than 0.05 then Ho is accepted. Data pretest and posttest control classes and experiments are normal.

1) Homogeneity test

After the entire test data of cognitive learning results tested normality, then the data test cognitive learning results tested homogeneity to know the data have the same variant or not. Here are the results of the pretest homogeneity test and the control group posttest with the experimental group.

Table 5.
Results of Cognitive Learning Homogeneity Test Results

Data	Signifikansi (p)	Condition	Description
Pretest	0,191	p > 0,05	Homogen
Posttest	0,783	p > 0,05	Homogen

Based on Table 5 obtained data pretest and posttest control class, experiments (VA) and experiments (VD). On the results of the homogeneity test pretest cognitive learning results had a significance level of 0.191, while on the results of the posttest homogeneity test cognitive learning results had a significance level of 0.592. Based on the results of significance values obtained on each type of data and exceeding 0.05 then Ho received and means the data is homogeneous.

1) T-test paired sample

To find out the improvement of students' cognitive learning outcomes in experimental classes before and after using pbl-based integrative thematic learning modules. Testing is conducted by analyzing pretest and posttest results in both experimental classes. The results of the paired sample t-test in the VA experiment class and the VD experiment class are shown in Table 6 as follows.

Table 6.
Test Different Cognitive Learning Outcomes Data

Description	Experimental VA		Experimental VD	
	Before	After	Before	After
Mean	59,77	81,03	59,88	79,65
N	29	29	29	29
Sig (2-tailed)	0,000	0,000	0,000	0,000
Analisis	p < 0,05	p < 0,05	p < 0,05	p < 0,05
Keterangan	Ho ditolak	Ho ditolak	Ho ditolak	Ho ditolak

Based on Table 6, it can be known that the significance value is less than 0.05 in both experimental classes which is 0.000 so that it can be interpreted that there is a significant increase between the average value of experimental grade students before and after using pbl-based integrative thematic learning modules. In addition to the results of paired t-tests, the improvement in student learning outcomes can also be known through comparison of average scores in experiment classes and control classes. The following are presented the results of a comparison of the results of cognitive learning control classes and experimental classes.

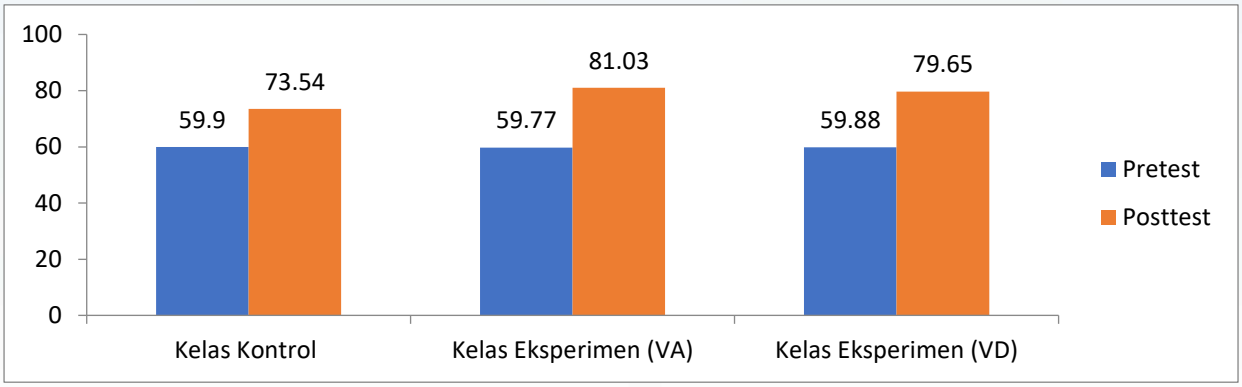

Figure 1. Comparison of Improved Cognitive Learning Outcomes

Based on Figure 1, it can be known that the improvement of cognitive learning outcomes in the experiment class is higher than the improvement of cognitive learning outcomes in the control class. The average pretest value in the control class is 59.9 and the posttest value is 73.54. In the experimental class (VA) the average value of cognitive learning outcomes increased higher than the pretest score of 59.77 and the posttest score of 81.03. In the experimental class (VD) the increase in cognitive learning outcomes also increased higher at an average pretest score of 59.88 and a posttest score of 79.65. Based on these results, it can be concluded that the use of PBL-based integrative thematic learning modules is more effective at improving students' cognitive learning outcomes compared to the use of student handbooks in learning.

1) Independent Sample t-test

To find out the difference in cognitive learning outcomes in control classes and experimental classes, the t test was then conducted using the Independent Sample t-test. The test was conducted by analyzing the pretest results of students in experimental and control classes. This is done to find out if there is a significant difference in the initial ability of learners between the three classes. In addition, testing is also conducted by analyzing students' posttest scores in control classes and experimental classes. The analysis of such data will be able to prove the existence and absence of significant differences in students' posttest abilities in all three classes. The following test results t student learning results are shown in the Table.

Table 7. Independent test results t test cognitive learning results

Data	Class	Sig. 2-tailed (p)	Kondisi	Keterangan
Pretest	Control Experimental VA	0,965	p > 0,05	Ho accepted
	Cntrol Experimental VD	0,994	p > 0,05	Ho accepted
Posttest	Control Experimental VA	0,002	p < 0,05	Ho rejected
	Control Experimental VD	0,020	p < 0,05	Ho rejected

Based on Table 12, the t test results contained in the table above the control class and experiment class (VA) pretest data show a significance of 0.965. In the pretest the control class and the experiment class (VD) showed a significance of 0.994. Thus at the value of significance p > 0.05, it

can be interpreted if the initial ability (pretest) in the control class and experimental class there is no significant difference.
While in the analysis of independent test results until the T-test on the final ability of students (posttest), obtained results between the control class and experimental class (VA) showed the significance of the score of 0.000. The control class and experiment class (VD) showed a significance of 0.024. Thus it can be interpreted if the final ability (posttest) in the control class and experimental class there is a significant difference because Ha is accepted and Ho is rejected. Based on the results of cognitive learning in the pretest and posttest, it can be concluded that there is a significant difference between the cognitive learning outcomes of students who use pbl-based integrative thematic modules (experimental classes) and students who do not use modules (control classes).

Discussion

Students' cognitive learning outcomes were tested using independent t-test samples and t-test paired samples and it is known that modules effectively improve cognitive learning outcomes. The effectiveness test was also supported by the results of differences in score gain scores on learning independence between the experimental class and the control class and histogram 5 on improving the average value of cognitive learning outcomes between the control class and the experimental class. As for affective learning outcomes and psychomotor learning outcomes are shown through observations made at each meeting on Histogram 6 and Histogram 7. The observations may show that significant improvements were seen in both experimental classes compared to the control class. Based on these results, it can be concluded that pbl-based integrative thematic learning modules are able to improve the independence of learning and learning outcomes of grade V students of SDN 1 Sape and SDN 2 Sape in Bima District, NTB
PbL-based integrative thematic learning modules are able to support learning in curriculum 2013. The use of supporting materials or teaching materials in learning is able to encourage students to be actively involved in the learning process. The use of materials or teaching materials is tailored to the characteristics of students and the applicable curriculum. PbL-based integrative thematic learning module adapts to the applicable curriculum, namely Curriculum 2013. Learning using Problem Based Learning-based integrative thematic modules encourages students to work in groups to solve problems together so that students can be more responsive in thinking and acting. As stated by Johnson and Johnson (2002) from Goodman (1990) "..., learning outcomes from the student interaction pattern promoted by the use of cooperative, competitive and individualistic goal structures". The use of PBL as a base in the module facilitates students to work in groups so that students are able to develop their potential in learning to the maximum. As Ferreira and Trudel (2012) explains, "Because problem-based learning requires that students solve problems collaboratively, the use of this approach has the potential of greatly influencing the classroom atmosphere (Selçuk et al., 2011)." The use of PBL-based integrative thematic learning modules emphasizes students' cooperation to find problem solving solutions because modules make the PBL model a key step in the preparation of learning activities.
PBL learning uses real-life problems as the main focus of learning so that learning is directed at the active involvement of students to solve the problem. Waridah and Aman (2015) explains that learning experiences in schools that are relevant to students' lives will help students solve problems faced in their daily lives and can provide learning how to socialize with the community. PBL is able to direct students to work with other students to discuss, exchange ideas and solve problems together so that students interact actively with other students. The study explains that learning that actively engages students in the learning process such as making discoveries and investigating information will be able to improve students' learning outcomes. Research conducted by Akcay (2009) also explained that in PBL students act as real investigators and active learners, students become independent learners who are able to investigate information, follow the steps of discovery and learn actively. Problem Based Learning is able to encourage students to actively gain learning experience through problem solving activities. In addition to improving learning independence, the Problem Based Learning model is also able to improve learning outcomes. The results of another study conducted by Tarhan and Sesen (2013) found that PBL is a model that is able to have a positive effect on the achievement of higher learning achievements, alternatives to instilling concepts, and the development of social skills. Problem Based Learning is able to facilitate students to acquire knowledge, attitudes and skills in the learning process (English &

Kitsantas, 2013).

There are several studies that support the explanation of the importance of PBL-based integrative thematic modules applied in learning. Research on such as the application of supporting teaching materials either modules or books that are able to improve the learning process. One of them is research conducted by Kurniawati, Wahyuni & Putra which utilizes jember comics and local wisdom as learning materials for Integrated Science. The results of the research were found that the utilization of supporting learning materials such as comic media and local wisdom was able to improve the implementation of the learning process and motivate students (Kurniawati et al., 2017). Supporting teaching materials such as comics, modules or books can be used as a means for teachers in optimizing learning for students. The use of supporting teaching materials is able to facilitate the ability of students in learning, especially learning independently so that teachers only act as facilitators. In addition, research conducted by Syafii and Yasin (2013) also developed problem-based modules that encourage students who learn independently. PbL-based integrative thematic learning module uses pbl model as a learning activity step so that learning activities involve students actively participating in learning a material in depth by making problems the key to learning.

Conclusion

Based on the above results and discussions, it can be concluded that problem-based integrative thematic learning modules effectively improve students' learning outcomes. The effectiveness of learning outcomes is measured through tests and observations. From tests on cognitive learning outcomes for both classes the experiment had the significance of $p<0.05$ based on independent t-test and paired sample t-test. In addition, the results of the va experiment class cognitive learning results had a posttest score of 81.03 with a completion of 89.65% and in the experiment class VD had a posttest score of 79.65 with a completion of 82.75%.

Referensi

Akcay, B. (2009). Problem-based learning in science education. *Journal of Turkish science education, 6*(1), 28-38. doi: http://www.tused.org/index.php/tused/article/view/104

Anderson, L. W., & Krathwohl, D. R. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*: Longman.

Andrini, V. S. (2016). The Effectiveness of Inquiry Learning Method to Enhance Students' Learning Outcome: A Theoritical and Empirical Review. *Journal of Education and Practice, 7*(3), 38-42. doi: https://core.ac.uk/download/pdf/234638364.pdf

Arends, D., & Kilcher, A. (2010). *Teaching for student learning: Becoming an accomplished teacher*. New York: Routledge.

Arends, R. I. (2012). *Learning to teach.* New York: Mc Graw Hill.

Borg, W. R., & Gall, M. D. (1984). Educational Research: An Introduction. *British Journal of Educational Studies, 32*(3), 274-274. doi: https://philpapers.org/go.pl?id=BORERA-2&proxyId=&u=https%3A%2F%2Fdx.doi.org%2F10.2307%2F3121583

Demirel, M., & Dağyar, M. (2016). Effects of problem-based learning on attitude: A meta-analysis study. *Eurasia Journal of Mathematics, Science and Technology Education, 12*(8), 2115-2137. doi: https://doi.org/10.12973/eurasia.2016.1293a

Ebel, R. L., & Frisbie, D. (1991). Essentials of Educational Measurement. Englewoods Cliffs (5 ed.): NJ: Prentice Hall.

English, M. C., & Kitsantas, A. (2013). Supporting student self-regulated learning in problem-and project-based learning. *Interdisciplinary journal of problem-based learning, 7*(2), 128-150. doi: https://doi.org/10.7771/1541-5015.1339

Ferreira, M. M., & Trudel, A. R. (2012). The Impact of Problem-Based Learning (PBL) on Student Attitudes Toward Science, Problem-Solving Skills, and Sense of Community in the Classroom. *The Journal of Classroom Interaction, 47*(1), 23-30. doi: http://www.jstor.org/stable/43858871

Gall, M. D., Borg, W. R., & Gall, J. P. (1996). *Educational research: An introduction, 6th ed*. White Plains, NY, England: Longman Publishing.

Goodman, L. (1990). *Time and learning in the special education classroom*. New York: State University of New York Press.

Johnson, D. W., & Johnson, R. T. (2002). Learning Together and Alone: Overview and Meta-analysis. *Asia Pacific Journal of Education, 22*(1), 95-105. doi: 10.1080/0218879020220110
Keshavarz, M. (2011). Measuring course learning outcomes. *Journal of Learning Design, 4*(4), 1-9. doi: http://dx.doi.org/10.5204/jld.v4i4.84
Killen, R. (2009). *Effective teaching and practice lesson from research and practice* (5 ed.). Victoria: Cengage Learning.
Kunandar. (2014). *Authentic assessment (assessment of student learning outcomes based on the 2013 curriculum) a practical approach accompanied by examples.* Jakarta: PT Raja Grafindo Persada.
Kurniawati, A. A., Wahyuni, S., & Putra, P. D. (2017). Utilizing of comic and Jember's local wisdom as integrated science learning materials. *International Journal of Social Science and Humanity, 7*(1), 47-50. doi: 10.18178/ijssh.2017.7.1.793
Leary, H. M. (2012). *Self-Directed Learning in Problem-Based Learning Versus Traditional Lecture-Based Learning: A Meta-Analysis.* (DOCTOR OF PHILOSOPHY), UTAH STATE UNIVERSITY, Logan, Utah. Retrieved from https://www.proquest.com/openview/fd14a524d24a9ada0bba8d5b34054811/1?pq-origsite=gscholar&cbl=18750
Miller, P. W. (2008). *Measurement and teaching*: Patrick W. Miller & Associates.
Prastowo, A. (2015). Creative Guide to Creating Innovative Teaching Materials: Creating Interesting and Fun Learning Methods. Yogyakarta: Diva Press.
Schunk, D. H. (2012). *Learning theories an educational perspective* (6 ed.). New York: Pearson.
Selçuk, G. S., Emiroglu, H. B., Tarakçi, M., & Özel, M. (2011). An integrated, problem-based learning material: The" satellite" module. *Asia-Pacific Forum on Science Learning & Teaching, 12*(1), 1-32. doi: https://www.researchgate.net/profile/Mustafa-Oezel-2/publication/289432025
Sukarjo. (2006). *A collection of learning evaluation materials*. Yogyakarta: PPs UNY.
Syafii, W., & Yasin, R. M. (2013). Problem solving skills and learning achievements through problem-based module in teaching and learning biology in high school. *Asian Social Science, 9*(12), 220-228. doi: http://dx.doi.org/10.5539/ass.v9n12p220
Tarhan, L., & Sesen, B. A. (2013). Problem based learning in acids and bases: Learning achievements and students' beliefs. *Journal of Baltic Science Education, 12*(5), 565-578. doi: https://www.researchgate.net/profile/Leman-Tarhan/publication/290813412
Wahab, A., Mahmud, A., & Tiro, M. A. (2018). The effectiveness of a learning module for statistical literacy. *The New Educational Review, 53*(3), 187-199. doi: 10.15804/tner.2018.53.3.16
Waridah, W., & Aman, A. (2015). Development of thematic-integrative learning tools on the theme of appreciating the services of sociocultural-based heroes in elementary schools. *Prima Edukasia Journal, 3*(2), 213-226. doi: https://doi.org/10.21831/jpe.v3i2.6465
Yastika, N., & Haryanto, H. (2016). The effect of the PBL method and the expository method on mathematics learning outcomes in fifth grade students. . *Journal of Prima Edukasia, 4*(1), 107-119. doi: https://doi.org/10.21831/jpe.v4i1.7716