Implementation of Problem Based Learning (PBL) Model Based on Local Wisdom of Dalihan Natolu Used by Animation Video to Improve Students' Creative Thinking Skills

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Abstract

One of the biology skills needed by students in facing the 21st century is the ability to think creatively. The Problem Based Learning model is very appropriate in fostering creative thinking skills. This study aims to determine the effect of implementing the Problem Based Learning model based on Dalihan Na Tolu local wisdom assisted by animated videos in improving creative thinking skills in Biology. This study applies the Quasi Experiment method with a Nonequivalent Control Group design. The subjects in this study were 36 students of class XA SMA Negeri 3 Pematangsiantar in the 2023/2024 academic year. The creative thinking skills in Biology in the experimental class with the Problem Based Learning Model based on Dalihan Na Tolu local wisdom assisted by animated videos were higher and better than the control class with the conventional learning model. With an average posttest of the experimental class of 91.04 and a maximum value of 100 after treatment. While the average posttest result of the control class was 49.83 with a maximum value of 69.75 after treatment. The creative thinking ability of Biology in the experimental class with the Problem Base Learning Model based on Dalihan Na Tolu local wisdom assisted by animated videos is higher and better than the control class with the conventional learning model. With an average posttest of the experimental class of 91.04 and a maximum value of 100 after treatment. While the average posttest result of the control class was 49.83 with a maximum value of 69.75 after treatment. The results of the study showed that the Problem Base Learning model based on Dalihan Na Tolu local wisdom assisted by animated videos had a significant effect on improving students' creative thinking abilities.

Keywords: Problem Based Learning Model, Animated videos, Dalihan Na Tolu local wisdom, creative thinking abilities.

1. Introduction

The concept of 21st century education has been adapted by the Ministry of Education and Culture of the Republic of Indonesia by developing a new curriculum 1). Creative and innovative (creative and innovative), 2) Critical thinking (critical thinking trait), 3) Integration of science, 4) Easy to get information (easy to get knowledge), 5) Have a communicative and collaborative spirit (communicative and collaborative spirit), 6) Respect for differences of opinion (respect for differences of opinion), and 7) lifelong education (long life education) for elementary, middle, high school, and vocational high school (Miller & Maellaro, 2016). The goal of teaching science is not just memorizing facts from textbooks. Instead, it is about sparking students' curiosity about the amazing world around them. Scientists at the University of California agree that by exploring science, students can actively discover scientific concepts, general rules, and even form their own ideas (hypotheses) - just as they do when studying other subjects. (Kusmianty et al., 2020).

Education prioritizes aspects of mastery of science and technology and prioritizes thinking skills and competitiveness to create an education system that is appropriate and in line with global demands (Akmal, 2019; Ansari et al., 2023). Utilization of local culture as a learning resource to increase local cultural knowledge and help students through real-world learning (Khusniati & Sudarmin, 2017). The learning process based on local culture and local wisdom makes it easier for students to understand competencies in learning. Local culture can be related to the implementation of the learning process in the classroom (Ramdiah et al., 2020). This global challenge is a stimulus for the development of education in Indonesia oriented towards high-level thinking. High-level thinking skills have the ability to think creatively, therefore education is adjusted to the demands in facing the challenges of changing local, national, and global life (Prasetiyo & Perwiraningtyas., 2017; Armandita, et al., 2016). This competition is not only in the fields of trade and industry, further in the field of human resources (HR) where the world of education is a source of human resources needed by various fields (Razak, 2017). Education should pay attention to thinking skills in facing the demands of the world of work, the development of science, technology and art, and the dynamics of global development (Atun, et al., 2016). Demands for improving the quality of higher education from various parties always emerge in various mass media and various education meeting forums (Lufri, 2017). These thinking skills can be trained, one of which is by training creative thinking skills (Celik, 2017). The creative thinking skills that are trained can be used in solving life problems nationally and globally (Shektibayev, et al., 2016). Education is the main program of each country to improve the quality of human resources, and functions to maintain self-existence in relations between nations. Each country positions education as the basis for improving the quality of human resources and the quality of life of the nation (Festiyed, 2018). The curriculum applied encourages students to be active in learning, not only relying on teacher explanations. Education in schools starts from classroom learning, teachers play an important role in improving the quality and standard of classroom learning related to the main tasks and functions of teachers as

educators, one of which is organizing active, efficient, creative, effective and enjoyable learning and learning by doing (Festiyed, 2018)

Creative thinking skills are a thinking process that allows students to apply their imagination in generating new ideas, hypotheses, or experiments. Creative thinking skills tend to be about how students can solve problems from various perspectives (Kurnia et al., 2021; Fitriyah et al, 2021). Creative thinking skills are skills that can be trained by giving individuals the opportunity to think and then express the ideas that arise in them according to their interests and needs (Kartina et al., 2021). Creative thinking skills aim for students to be able to produce ideas or concepts that tend to be new or unique (Herman et al., 2022). Creative thinking skills are a form of fluency in the combination of logical thinking and divergent thinking based on intuition but still consciously (Hasanuddin, 2017). Creative thinking skills need to be improved in students so that students can answer the problems faced in their own lives (Hagi and Mawardi, 2021). Students can be said to have good creative thinking skills if they meet the characteristics of the creative thinking skills indicators (Ahmad et al., 2022). There are four indicators of creative thinking, including fluency, flexibility, originality, and elaboration (Silalahi et al., 2020). Creative thinking skills are one of the stages of thinking skills that adjust good and correct answers to help students solve problems from various perspectives (Atikah and Ramadhani, 2021). Problems also arise in various learning regarding creative thinking skills which are still very lacking in Indonesia (Fitriyah et al., 2021). Several aspects that are closely related to the quality of education are the quality of the learning process, which is expected to be the key to creating individuals who are able to apply knowledge properly and correctly (Lufry, 2017). In the research of Tyaningsih et al. (2021) that the ranking of the Indonesian creativity event in the Creativity and Prosperity: Global Creativity Index in 2019 was ranked 85 out of 129 countries. This is quite concerning for the Indonesian nation which has very minimal creativity values. This is also in line with research conducted by Hans Jellen from the University of Utah USA and Klaus Urban from the University of Hannover which showed that among the 8 countries studied, namely the Philippines, the United States, England, Germany, India, China, Cameroon, Zulu and Indonesia, it turns out that student creativity in Indonesia is the lowest (Faturohman, et al 2020). The problem of low 21st century skills in Indonesia is caused because the education process carried out in Indonesia is still not directed at 21st century education, especially the development of thinking skills (Alberida, 2019), besides that this problem is also caused because the education process that has been carried out only emphasizes the goal of achieving learning outcomes on the substance of the subject matter so that it does not stick with students for long (Afifah, 2015). Education should pay attention to thinking skills in facing the demands of the world of work, the development of science, technology and art, and the dynamics of global development (Atun, et al., 2016; Sastromiharjo et al., 2024). These thinking skills can be trained, one of which is by training creative thinking skills (Celik, 2017). Creative thinking skills that are trained can be used to solve life problems nationally and globally (Shektibayev, et al., 2016).

According to Octavia (2021: 212), teachers explore the potential that exists in each student, so that their potential is well empowered. Teachers can help students introduce the socio-cultural diversity of the area where they live and direct the social attitudes that exist in the culture of the place of residence and use all their potential to achieve maximum self-actualization. The results of research by Syarifuddin et al. (2022) prove that all students always need a fun learning model

or strategy. One learning model that can support the development of students' social attitudes is Problem Based Learning. Qondias et al. (2022) the Problem Based Learning model with cultural content can have a positive impact on social attitudes. Yustianingsih et al. (2017) stated that Problem Based Learning is a learning model that directly involves students through stages of activities to solve a problem in their own way and use various information without having to imitate the way the teacher works in solving problems that are applied in real life. The results of research conducted by Soraya et al. (2019) that the Problem Based Learning learning model based on culture has a positive effect on students' creative thinking. The Problem Based Learning model based on local wisdom Dalihan Natolu is better than conventional learning models in achieving students' creative thinking skills (Primayanti et al., 2019). Thus, the Problem Based Learning model based on local wisdom Dalihan Natolu to improve social attitudes is designed with the aim of preparing elementary school students to have social attitudes that are in accordance with their living environment, appreciate cultural diversity, and be able to contribute to community, national and state life. If this research is not carried out, researchers are concerned about the loss of students' social attitudes. According to researchers, knowledge of social attitudes in local culture has benefits for the current generation in facing the flow of globalization. One of the socio-cultural interaction patterns that contains soft skills in the community around SMA Negeri 3 Pematang Siantar is the Dalihan Na Tolu social interaction pattern. The Dalihan Na Tolu social interaction pattern is an educational interaction pattern in Batak culture that is full of soft skills aspects and is good to apply in the learning process at school (Bornok, 2009). Dalihan Natolu is the basis of Batak people's life that regulates their people in relating and behaving towards every level of the Batak Toba tribe's society wherever they are. Dalihan Natolu literally means a three-stove or a stove made of three stones arranged symmetrically to support the cauldron together when cooking (Siregar, et al., 2017). Dalihan Natolu is essentially divided into 3, namely: somba marhula-hula (Bone), elek Marboru (Boru), and manat mardongan tubu (Semarga) which of course have structured and permanent rights and obligations. Based on these three main elements, Batak people in the Dalihan Natolu cultural system are required to behave in a way that helps or cares for relatives at every opportunity. This behavior is perceived as a high value and is a noble and sublime act (Pasaribu, 2014; Purba et al., 2023). The ideal society according to the Batak tribe is a society in which holong (affection) is found in the nature of social interaction. Holong is used as the source of all life. Therefore there is a term: holong do mula ni adat (affection at the beginning of custom), or holong do mamboan domu, domu mamboan parsaulian which means "affection brings intimacy, intimacy brings common good" (Ahmad & Effendi, 2018). If a problem occurs, either sorrow or joy, these three groups interact with each other to find a way out to solve the problem, and carry out an activity. The dongan tubu group as the source of the problem or activity, through the deliberation process (marria raja) a problem or activity is planned and solved properly. Sometimes the solution to the problem is not agreed upon, the way out is the Dalihan Na Tolu group is complemented by one more group, namely the dongan sahuta group. The dongan sahuta group is a community that lives in the village where the problem occurs. This group is sometimes more respected, not just an invitation but also participates in providing ideas in solving the problem.

The Dalihan Na Tolu social interaction pattern is a Batak kinship rule that appears in social relations between individuals, families, and the surrounding community. This rule contains

positions, manners (behavior), rights and obligations in placing oneself as an individual, family, and community in solving life's problems. This Dalihan Na Tolu kinship and social interaction pattern will be abstracted (extension abstraction), namely from the previous Dalihan Na Tolu concept, the different tasks and functions of each subgroup are dropped and pay attention to the same rights, responsibilities, cooperation, and obligations in solving problems. This interaction pattern is utilized and applied as an educational interaction pattern as a strategy to activate students in the application of a problem-based learning model based on Batak culture that regulates collaborative activities between students; students and teachers; students with problems by paying attention to the interaction patterns of the four kinship groups and ignoring the different functions of each group in solving problems. This is in accordance with the form of group discussion compiled by (Sinaga, 2009) in group discussions in class. Dalihan Na Tolu is one of the local wisdoms in North Sumatra which is a science related to cultural values that need to be preserved to maintain the balance and diversity of human culture (Siagian et al, 2022). As technology develops, it influences social interactions, especially the millennial generation, which has an impact on cultural development, namely the entry of foreign cultures so that cultural cultures are forgotten. Terms such as the millennial generation are a study of generation theory that is increasingly developing along with changing times and technological advances (Sihombing, 2018; Widodo et al., 2024). The principle of Dalihan Na Tolu, which is a legal subsystem and is rooted in the lives of people in the Batak Toba region, contains legal values that regulate the behavior of the Batak Toba customary law community and also has divisions. The task of resolving conflicts inherent in kinship ties in society also includes how to resolve conflicts in the kinship system (Butarbutar, 2019; Purba et al., 2024a). Dalihan Na Tolu is a philosophy that is an inseparable part of the lives of the Batak Toba people. In all activities, be it marriage, death, happy or sad birth, Dalihan Na Tolu forms a unifying framework (Lubis & Joebagio, 2019). Vygotsky's theory states that human development is greatly influenced by the interaction between interpersonal (social), cultural-historical, and individual factors (Puspasari et al., 2019).

The connection between learning in schools and Dalihan Na Tolu lies in the values inherited in culture. One of the main values passed on in Dalihan Na Tolu is respect for the knowledge possessed by parents or older generations. In this context, learning can be seen as part of the process of respecting the knowledge and wisdom possessed by older generations in Batak society. A creative learning process should teach students to appreciate and utilize the knowledge that has been inherited from previous generations to improve their understanding of natural and environmental phenomena.

The recommended learning model in science learning including biology to achieve graduate competency standards, one of which is the problem-based learning model or Problem Based Learning. PBL is a learning model that is oriented towards investigation or discovery. Actually, the problem-based learning model can train creative thinking skills. As stated by Arends & Kilcher (2010) who stated that investigation in the PBL model requires critical thinking skills and open-ended situations which will later be able to bring up creative thinking skills (Purba et al., 2024b). Through creative thinking skills, students can have ideas to find new solutions to a problem. However, it turns out that in the field the results of students' creative thinking skills at SMA Negeri 3 Pematang Siantar have not been as expected. The obstacle encountered is that

teachers experience limitations in implementing the model in the learning process to facilitate students' creative thinking skills and decision-making. Creative thinking skills and decision-making require appropriate learning conditions/environments so that they can facilitate the growth and development of these thinking skills. According to Moreno (2010), an environment that supports creative learning is an environment where students feel safe to share unusual ideas with others, dare to take risks, are free to choose and convey their own creative ideas. In addition, there are several activities that can develop creative thinking such as: observation activities, experiments, field visits (Sener et al., 2015), discussions (Anjarsari, 2014), and providing open questions (Kutlu, 2015). In general, teachers experience limitations in creating a democratic, open learning environment. Teachers still blame students' answers that are not the same as those taught/notebooks. According to Aksoy (2005) any factor that limits student freedom will have a negative impact on the development of students' creative talents. Student creativity can currently be improved through an approach specifically designed to train creative thinking skills with the Problem Based Learning (PBL) learning model (Abdurrozak et al., 2016; Wardani & Purwandari, 2018; Hasibuan et al., 2019). The PBL learning model is a learning model that is useful for improving creative thinking skills that encourage students to actively learn. PBL learning has shown empirical facts that can encourage the effectiveness of learning outcomes, but some weaknesses are still found. Gorghiu et al., (2015) stated that the PBL learning model has weaknesses, namely, it does not provide enough feedback in learning so that the role of students in the learning process is not optimal. The results of the study by Moutinho et al., (2014) stated that by using the PBL learning model, creative thinking and imagination are emphasized in the construction of scientific knowledge, but are less related to the nature of contemporary science and its applications. The same thing was also stated by Nariman & Chrispeels (2016) that the weaknesses of PBL implementation are: 1) instructions in exploring are not in-depth enough, students are not trained enough in determining the use of objects for scientific purposes, asking scientific questions and finding answers to these questions. 2) also explained that PBL activities individually or in groups cannot always improve student learning achievement (Fitriani et al., 2019). 3) PBL syntax was found to be ineffective in motivating students who were less prepared to face psychological pressure. Lack of student readiness also causes low self-confidence in organizing and solving problems (Nijhuis, et al, 2005). Therefore, the PBL syntax needs to be modified and adjusted to the conditions and learning situations in Indonesia so that students' motivation and creative thinking can increase as they should. Appropriate modifications can include incorporating local culture into education. Instilling cultural values during the educational process serves as a medium to motivate students to apply the knowledge they have acquired. (Ibe, 2017). Culturally integrated learning can also encourage students' imaginative, metaphorical and creative processes and increase students' cultural awareness, performance, and interest in Biology (Davison & Miller, 1998; James 2006: Caballero, 2015). The integration of local culture into the school curriculum also contributes to efforts to preserve local Indonesian values that have begun to fade and be abandoned by students who do not understand local cultural values (Uge, et al, 2019).

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According to Eismawati, Koeswanti, & Radi (2019), the Problem Based Learning (PBL) learning model is a learning model that can shape and advance students so that they have expertise in solving problems in learning activities and also to encourage students to develop thinking skills so that they can think more creatively. Rizqi, Yulianawati, & Nurjali (2020) agree with the study, that the Problem Based Learning (PBL) learning model can train students' conceptual understanding skills. In addition to the use of problem-solving-based learning models, it is also important to utilize learning media as an effort to make it easier for students to understand the material. One of the media that can be used is animated videos. According to Wahyuni (2022), animated videos have a positive effect because they can improve student learning outcomes and make it easier to understand explanations that may be difficult to understand visually (Setiawati et al., 2024). Learning materials delivered through animated video media are more effective and dynamic, so that students are more enthusiastic in participating in learning activities.

As an effort to improve the weaknesses of the PBL model so that this model can be applied optimally by teachers, one of which is to develop an alternative learning model which is the result of innovation from the model, namely the PBL Model based on local wisdom Dalihan NA Tolu Assisted by Animated Videos to improve students' creative thinking skills.

2. Research Methodology

This study uses a quantitative approach, with a Quasi Experiment Design in the form of Nonequivalent Control Group Design as an experimental design as seen in table 1 below;

Table 1. An Overview of Research Design

Group	Pre-test	Treatment	Post-test
Experiemental	O1	Problem Based Learning model learning based on local wisdom Dalihan Na Tolu assisted by animated videos	O2
Control	O3	conventional learning	O4

Notes:

O1, O2 : pretest

O3, O4 : posttest

This research was conducted at SMA Negeri 3 Pematangsiantar, Bantul, with the research subjects being all students of class X of SMA Negeri 3 Pematangsiantar totaling 432 students divided into 12 classes starting from class X A-X L. Sampling in this study used a purposive sampling technique. The sample in this study as the target of the study was the class of SMA Negeri 3 Pematangsiantar consisting of 36 students as an experimental class that was given Problem Based Learning model learning based on Dalihan Na Tolu local wisdom assisted by animated videos and conventional learning was given to class X D with 36 students as a control class.

This study used data collection techniques in the form of non-test instruments including observation, attitude scale questionnaires, student daily journals and interviews. To determine the ability to think creatively in biology in the experimental class and the control class, a test instrument will be given in the form of questions on the ability to think creatively in biology based on Dalihan Natolu local wisdom culture. Before being used, the instrument validation process was carried out first. After the instrument was declared valid, the experimental research was carried out. The questions given to students included pretest and posttest questions. Treatment is given after the pretest and after the posttest. The hypothesis of this study is that there is a significant influence between the use of the Problem Based Learning Model based on local wisdom of Dalihan Natolu culture assisted by animated videos on the ability to think creatively in biology. The data analysis technique used in this study is the test of equality of means (t-test).

3. Results and Discussion

The results of the pretest and posttest scores in the control class and the experimental class are as follows:

Table 2. Description of the pretest and posttest scores in the experimental class and the control class

Description	Control Class		Experimental Class	
	Pretest	Posttest	Pretest	Posttest
Mean	23,07	49,83	31,08	91,04
Modus	19,75	57,25	19,75	100
Median	26	51	32,25	94,75

Standard Deviation	9,09	13,74	12,39	9,51
Variance	66,49	163,40	130,63	91,37
Minimum Score	7,25	19,75	13,50	76
Maximum Score	32,25	69,75	69,75	100

Based on table 2. above, in the control class, the average pretest score was 23.07 and the average posttest score was 49.83. While in the experimental class, the average pretest score was 31.08 and the average posttest score was 91.04. From the achievements in the control class and the experimental class, it can be analyzed that the ability to think creatively in biology in the experimental class with the Problem Base Learning Model based on local wisdom of Dalihan Natolu culture assisted by animated videos is higher and better than the control class with the conventional learning model. It can be interpreted that the Problem Base Learning Model learning based on local wisdom of Dalihan Natolu culture assisted by animated videos improves students' creative thinking skills in biology on ecology material. The activity of the Problem Base Learning model in mathematics learning is able to achieve indicators of creative thinking skills in biology (Damanik & Syahputra, 2018). After knowing the learning outcomes of the experimental class and the control class, a normality test and a homogeneity test were then carried out as a requirement to conduct a test of the similarity of two means (t-test). the results of the pretest and posttest normality tests in the experimental class and control class showed an Asymp. Sig. (2-tailed) value greater than 0.05 so that it can be concluded that each experimental class and control class are normally distributed. The results of the homogeneity test showed a significance test of homogeneity of variance value showing $p = 0.173$ ($p > 0.05$). So it can be concluded that the data variance is the same or there is no difference in variance between the compared data groups. After the normality and homogeneity tests, a t-test was then carried out through a one-sided test using the Independent Sample t-Test with the help of IBM SPSS Statistics software. The test of the similarity of two means (t-test) to determine the average creative thinking ability of students in biology with the Problem Base Learning Model based on local wisdom of Dalihan Natolu culture assisted by animated videos in the experimental class with the creative thinking ability of students in biology in the control class with conventional learning models.

Table 3. Test of Equality of Two Means (t-Test).

	Levene's Test for Equality of Variances		t-test for Equality of Means			
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Equal variances assumed	1,898	0,174	14,664	62	0,000	41,21095
Equal variances not assumed			14,664	57,345	0,000	41,21095

Based on table 3. above, the Sig. (2-tailed) value is 0.000 <0.05. So Ho is rejected because the significance value <α, while Ha is accepted. So it can be concluded that there is a significant influence between the use of the PBL Model based on Dalihan Na Tolu Local Wisdom assisted by Animated Videos on Biology creative thinking skills. The students' attitudes towards the use of Animated Videos based on Dalihan Na Tolu Local Wisdom in the experimental class can be seen based on the results of non-test instruments in the form of questionnaires. The attitude scale questionnaire was filled out by 32 students of class X A of SMA Negeri 3 Pematangsiantar. This questionnaire aims to determine students' responses and strengthen the assumption that learning Animated Videos based on Dalihan Na Tolu Local Wisdom provides a positive attitude.

Table 4. Percentage of Attitude Scale Questionnaire

No	Aspects	Percentage	Criteria
1	Graphics and Usability	73%	Strong
2	Effectiveness	71%	Strong
3	Persistence in the face of adversity	76%	Strong
4	Students' attitudes towards the use of media in learning	69%	Strong

From table 4. above, it can be concluded that learning animated videos based on Dalihan Na Tolu local wisdom provides a positive attitude. Then a questionnaire, student daily journals and interviews were given to see student responses and strengthen the assumption. The graphic and usability aspects have a percentage of 73% with strong criteria, the effectiveness aspect is 71% with strong criteria, the tenacity aspect in facing difficulties is 75% with strong criteria and the student attitude aspect towards the use of media in learning is 69% with strong criteria. The average percentage results of all aspects of the attitude scale questionnaire towards the use of animated video media are 72.25%. The average percentage of all aspects has strong criteria. This means that learning assisted by animated videos based on Dalihan Na Tolu local wisdom provides a positive attitude in class X A students. The use of animated video media provides a positive attitude which can also be seen from the summary of student daily journals and interviews. The response shows that the use of animated video media is very helpful for students in solving problems. Students who have difficulty can be helped in overcoming these problems. Questions that contain images such as Dalihan Na Tolu local wisdom images are easier for students to understand in illustrating and solving questions. The average percentage of all aspects has strong criteria. This means that learning assisted by animated videos based on Dalihan Na Tolu local wisdom provides a positive attitude to class X A students. Interviews and student diary journals in the form of student impressions and messages during learning were also carried out several times throughout this study. Based on interviews and journals, it shows that the use of animated video media is very helpful for students in solving problems. The difficulties experienced by students can be helped to be solved easily. Presenting problems using animated videos can help students identify and solve problems and attract students' interest because animated videos can provide a fast response process to students. In addition, the Dalihan Na Tolu local wisdom aspect makes students more interested in taking biology classes and motivated to study harder (Choir & Abdullah, 2021). Questions that contain images such as Dalihan Na Tolu

local wisdom images are easier for students to understand in illustrating and solving questions. The increase in students' creative Biology abilities with indicators of originality, fluency, flexibility, and elaboration can be seen based on the results of interviews where students are able to answer questions according to the indicators mentioned using animated videos. First, participants are able to answer questions with various methods, second when experiencing obstacles in working on questions, students are able to find other methods, third participants are able to elaborate, and fourth participants are able to provide different answers from each other. The interview results also showed that students were able to provide various possible answers based on the knowledge gained with an emphasis on the diversity of numbers and appropriateness.

4. Conclusions and Suggestions

Based on the results of the analysis and discussion of the research that researchers have conducted at SMA Negeri 3 Pematangsiantar, it can be concluded that; There is an increase in creative thinking skills in Biology using the Problem Based Learning Model based on Dalihan Na Tolu local wisdom assisted by animated videos. The creative thinking skills in Biology in the experimental class with the Problem Based Learning Model based on Dalihan Na Tolu local wisdom assisted by animated videos are higher and better than the control class with conventional learning models. With an average posttest of the experimental class of 91.04 and having a maximum value of 100 after treatment. While the average posttest result of the control class was 49.83 with a maximum value of 69.75 after treatment. Through daily journals, students wrote that they understood better when there was a video, namely a learning video according to ecological material. Learning using the Dalihan model based on Dalihan Na Tolu local wisdom assisted by animated video media can improve students' creative thinking skills.

WORKS CITED

Abdurrozak, R., Atun, I., & Jayadinata, A.K. (2016). Pengaruh Model Problem Based Learning terhadap Kemampuan Berpikir Kreatif Siswa. Jurnal Pena Ilmiah, 1(1), 871-880.

Afifah, R. N. (2015). Pengembangan Lembar Kerja Siswa (LKS) Ilmu Pengetahuan Alam Berbasis Metode Percobaan. Universitas PGRI Yogyakarta.

Ahmad, M., Siregar, Y. P., Siregar, N. A., & Effendi, H. (2018). Realistic math-based learning model based on Mandailing culture. International Journal of Sciences: Basic and Applied Research (IJSBAR) Volume, 39(1), 67-78.

Akmal. (2019). Lebih dekat dengan industri 4.0. Deepublish.

Alberida, H., & Barlian, E. (2019). Enhancing student's science process skills through problem solving model: an effectiveness study. Journal of Physics: Conference Series (Vol. 1317, No. 1, p. 012181). IOP Publishing.

Ansari, B. I., Junaidi, J., Maulina, S., Herman, H., Kamaruddin, I., Rahman, A., & Saputra, N. (2023). Blended-Learning Training and Evaluation: A Qualitative Study. Journal of Intercultural Communication, 23(4), 155–164. https://doi.org/10.36923/jicc.v23i4.201

Celik, M. (2017). Examination of Children Decision Making Using Clues During the Logical Reasoning Process. Educational Research and Reviews, 12(16), 783-788.

Choir, R. M., & Abdullah, A. A. (2021). Pengaruh Penggunaan Media Pembelajaran Interaktif Berbasis Android dengan Pendekatan Matematik Realistik terhadap Hasil Belajar Matematika Siswa Kelas VII.

LITERASI (Jurnal Ilmu Pendidikan), XII(2), 85–91. Retrieved from https://www.ejournal.almaata.ac.id/index.php/LITERASI/article/view/1894.

Damanik, W. J., & Syahputra, E. . (2018). Pengembangan Perangkat Pembelajaran Untuk Menigkatkan Kemampuan Berpikir Kreatif Matematis Siswa Menggunakan Model Discovery Learning. Inspiratif: Jurnal Pendidikan Matematika, 4(1), 27–38. https://doi.org/10.24114/jpmi.v4i1.9294

Davison, D. M., & Miller, K. W. (1998). An Ethnoscience Approach to Curriculum Issues for American Indian Students. School Science and Mathematics, 98(5), 260-265. doi:10.1111/j.1949-8594.1998.tb17299.x

Eismawati, E., Koeswanti, H. D., & Radia, E. H. (2019). Peningkatan Hasil Belajar Matematika Melalui Model Pembelajaran Problem Based Learning (PBL) Siswa Kelas 4 SD. Jurnal Mercumatika : Jurnal Penelitian Matematika Dan Pendidikan Matematika, 3(2), 71–78.

Faturohman, I., & Afriansyah, E. A. (2020). Peningkatan Kemampuan Berpikir Kreatif Matematis Siswa melalui Creative Problem Solving. Mosharafa: Jurnal Pendidikan Matematika, 9(1), 107–118. https://doi.org/10.31980/mosharafa.v9i1.596

Festiyed, F., & Desmalinda, D. (2018). Pengembangan Sumber Energi Listrik Alternatif Terbarukan untuk Meningkatkan Kreativitas dan Aktivitas Siswa Pada Pembelajaran Fisika. JURNAL PDS UNP, 1(1), 120-125.

Fitriani, H., Asy'ari, M., Zubaidah, S., & Mahanal, S. (2019). Exploring the Prospective Teachers' Critical Thinking and Critical Analysis. Jurnal Pendidikan IPA Indonesia, 8(3), 379-390. doi:10.15294/jpii.v8i3.19434

Fitriyah, A., & Ramadani, S. D. (2021). Pengaruh pembelajaran STEAM berbasis PjBL (Project-Based Learning) terhadap keterampilan berpikir kreatif dan berpikir kritis. Jurnal Inspiratif Pendidikan, 10(1), 209-226.

Gorghiu, G., Draghicescu, L. M., Cristea, S., Patrescu, M., & Gorghiu, L. M. (2015). Problem-Based Learning: An Efficient Learning Strategy in the Science Lessons Context. Procedia-Social and Behavioral Sciences, 19 (10), 1865-1870.

Hasanuddin, R., & Sjahruddin, H. (2017). The structure of emotional intelligence, spiritual intelligence and its relationship with work enthusiasm and auditor performance. Structure, 3(1), 67-85.

Herman, H., Shara, A. M., Silalahi, T. F., Sherly, S., and Julyanthry, J. (2022). Teachers' Attitude towards Minimum Competency Assessment at Sultan Agung Senior High School in Pematangsiantar, Indonesia. Journal of Curriculum and Teaching, Vol. 11, No. 2, PP. 01-14. DOI: https://doi.org/10.5430/jct.v11n2p1.

Ibe, E. (2017). Effects of Ethnoscience and Traditional Laboratory Practical on Science Process Skills Acquisition of Secondary School Biology Students in Nigeria. British Journal of Multidisciplinary and Advanced Studies, 35-46. III, no. 1 (2017): 13–15.

Kartina, I. (2021). Kesantunan Berbahasa Dalam Konten Vlog Youtube Sherly Annavita Rahmi (Deskripsi terhadap Pemakaian Bahasa Indonesia dalam Media Sosial). Diksatrasia: Jurnal Ilmiah Pendidikan Bahasa dan Sastra Indonesia, 5(1). DOI:10.25157/diksatrasia.v5i1.6537

Kurnia, dkk. (2021). Pangan Fungsional Untuk Proyek Independen KKN-Tematik Di Masa Pandemi Covid19. Selaparang. Jurnal Pengabdian Masyarakat Berkemajuan. 5(1), 608-615. https://Doi.Org/10.31764/Jpmb.V5i1.5749

Khusniati, P., & Sudarmin. (2017). Local wisdom-based science learning model through reconstruction of indigenous science to improve student's conservationist character. Journal of Turkish Science Education, 14(3), 16–23.

Lufri, L., Fitri, R. and Yogica, R. (2017) Pengembangan Model Pembelajaran Berbasis Konsep, Gambar dan Metode Drill untuk Meningkatkan Kemampuan Mahasiswa Memahami Konsep dan Berfikir Tingkat Tinggi Pada Mata Kuliah Perkembangan Hewan: tahun ke 1 dari Rencana 2 Tahun. Project Report. FMIPA UNP, Padang

Moreno, R. (2010). Educational Psychology. Cambridge: John Wiley & Son. Inc.

Moutinho, S., Torres, Joana, T., Fernandez, I., & Vasconcelos, C. (2014). Problem-Based Learning and Nature of Science: A Study With Science Teachers. Procedia - Social and Behavioral Sciences, 11(9), 1871–1875.

Nariman, N., & Chrispeels, J. (2016). PBL in the Era of Reform Standards: Challenges and Benefits Perceived by Teachers in One Elementary School. Interdisciplinary Journal of Problem-Based Learning, 10(1), 1-15.

Nijhuis, J. F., Segers, M. S., & Gijselaers, W. H. (2005). Influence of redesigning a learning environment on student perceptions and learning strategies. Learning environments research, 8, 67-93.

Octavia, S. A. (2021). Profesionalisme guru dalam memahami perkembangan peserta didik. CV Budi Utama.
Primayanti, P. E., Suarjana, I. M., & Astawan, I. G. (2019). Pengaruh model PBLbermuatan kearifan lokal terhadap sikap sosial dan kemampuan berpikir kritis matematika siswa kelas V di gugus V Kecamatan Sukasada. Journal of Education Technology, 3(1), 28-34. https://doi.org/10.23887/jet.v3i1.17961

Purba, A., Purba, R., Herman, H., Sinurat, B. and Nainggolan, P. N. (2023). Identifying Turn-Taking Strategies in Toba Batak Wedding Traditional "Mangulosi": A Case on Conversation Analysis. Research Journal in Advanced Humanities, 4(4). https://doi.org/10.58256/8tvsk791

Purba, R., Corry, C., Herman, H., Ngongo, M., Saragih, H., Nasution, T., & Sipayung, R. W. (2024). Simalungun addressing terms based on the kinship system of the Tolu Sahundulan Lima Saodoran. Research Journal in Advanced Humanities, 5(3). https://doi.org/10.58256/fm64kj51

Purba, N., Sipayung, R. W., Rahmawati, R., Siagian, B. A., Herman, H., Saragi, C. N., and Fatmawati, E. (2024). An Implementation of Project-Based Learning (PBL) Teaching Model in Improving Early Child's Critical Thinking Skill. Library Progress International, 44(3), 90-96.

Qondias, D., Lasmawan, W., Dantes, N., &Arnyana, I. B. P. (2022). Effectiveness of multicultural problem-based learning models in improving social attitudes and critical thinking skills of elementary school students in thematic instruction. Journal of Education and E-Learning Research, 9(2), 62–70. https://doi.org/10.20448/jeelr.v9i2.3812

Ramdiah, S., Abidinsyah, A., Royani, M., Husamah*, H., & Fauzi, A. (2020). South Kalimantan local wisdom-based biology learning model. European Journal of Educational Research, 9(2), 639–653. https://doi.org/10.12973/eu-jer.9.2.639

Razak, A. (2017). Refleksi Penerapan Model Pembelajaran Problem Based Learning dalam Ma ta Kuliah Ekologi Hewan. Minang Educator, 1(2). RI.

Sastromiharjo, A., Rintaningrum, R., Herman, H., Mislikhah, S., Solissa, E. M., Lastriyani, I., Saputra, N., and Purba, R. (2024). Using Google Sites to Improve Students' Learning Outcomes in Writing Ability: A Case on Teaching Language Education. EVOLUTIONARY STUDIES IN IMAGINATIVE CULTURE, 8.1., 728-736. https://doi.org/10.70082/esiculture.vi.785

Şener, N. (2021). The relationship between primary school students' social skills and attitudes towards social studies course and their academic achievement. Education Quarterly Reviews, 4(2). https://doi.org/10.31014/aior.1993.04.02.305

Shektibayev, N., Baimukhanbetov, B., Omarov, B., Berdi, D., Usembaeva, I., & Ramankulov, S. (2016). Formation of the Creativity of Students in the Context of the Education Informatization. International Journal Of Environmental Science Education, 11(16), 9598-9613.

Siagian, G., Wulandari, T., Lufri, L., Asrizai, A., & Hardeli, H. (2023). THE ROLE OF DALIHAN NA TOLU IN IMPROVING SCIENCE EDUCATION IN ETHNOSCIENCES: A PHILOSOPHY PERSPECTIVE. Jurnal Muara Pendidikan, 8(1), 152–157. https://doi.org/10.52060/mp.v8i1.1049

Sinaga, B. (2009). Model pembelajaran bermuatan soft skills dengan pola interaksi sosial dalihan na tolu. Generasi Kampus, 2(1). https://jurnal.unimed.ac.id/2012//index.php/gk/article/view/6949

Siregar, M. (2017). Ketidaksetaraan Gender Dalam Dalihan Na Tolu. Jurnal Studi Kultural, III(1), 13-15. https://erepository.uwks.ac.id/16682/1/3.4.pdf

Soraya, D., Jampel, I. N., & Diputra, K. S. (2019). Pengaruh model pembelajaran problem based learning (pbl) berbasis kearifan lokal terhadap sikap sosial dan berfikir kritis pada mata pelajaran matematika. Thinking Skills and Creativity Journal, 1(2). https://doi.org/10.23887/tscj.v1i2.20409

Syarifuddin, S., Anjarwati, R. A., Aisyah, S., Putro, H. P. N., & Triana, Y. (2022). Desain pembelajaran ips berbasis teknologi informasi di sekolah dasar. Jurnal PGSD: Jurnal Ilmiah Pendidikan Guru Sekolah Dasar, 15(1), 23–32. https://doi.org/10.33369/pgsd.15.1.23-32

Uge, S., Neolaka, A., & Yasin, M. (2019). Development of Social Studies Learning Model Based on Local Wisdom in Improving Students' Knowledge and Social Attitude. International Journal of Instruction, 12(3), 375-388. doi:10.29333/iji.2019.12323a

Wardani, Kusuma, P. O. E., & Purwandari. (2018). Penerapan Model Problem Based Learning pada Pembelajaran Fisika untuk Meningkatkan Kemampuan Berpikir Kreatif dan Keaktifan Siswa Kelas X Listri SMK Gamaliel 1 Madiun. Prosiding Seminar Quantum: Pend. Fisika UAD.

Widada, W., Herawaty, D., Nugroho, K. U. Z., and Anggoro, A. F. D. (2021). Augmented Reality assisted by GeoGebra 3-D for geometry learning Augmented Reality assisted by GeoGebra 3- D for geometry learning. Journal of Physics: Conference Series, 1731(012934), 1–10. https://doi.org/10.1088/1742-6596/1731/1/012034

Widodo, Y. B., Herman, H., Afrianti, D., Rahmawati, R., Aslam, A., Saputra, N. and Sari, I. (2024). An Analysis on the Implementation of Artificial Intelligence (AI) to Improve Engineering Students in Writing an Essay. Nanotechnology Perceptions, 20(S8), 774-785. https://doi.org/10.62441/nano-ntp.v20iS8.64

Yustianingsih, R., Syarifuddin, H., & Yerizon, Y. (2017). Pengembangan perangkat pembelajaran matematika berbasis problem based learning (pbl) untuk meningkatkan kemampuan pemecahan masalah peserta didik kelasVIII. JNPM (Jurnal Nasional Pendidikan Matematika), 1(2), 258. https://doi.org/10.33603/jnpm.v1i2.563