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The Effect of Dynamic Electric Puzzle Science Tool-Assisted Inquiry Learning Model Towards Students' Creative Thinking Skills

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Abstract

The implementation of physics learning still does not involve students' thinking processes. It is very important to practice higher-order thinking skills, one of which is creative thinking. One of the mandated learning models in the 2013 Curriculum is inquiry. This study aimed to analyze the effect of dynamic electric puzzle science tool-assisted inquiry learning on students' creative thinking skills compared to conventional learning. This study used a quasi-experiment research type with a control group pretest-posttest design. This study was done in class XII. The sampling technique was purposive sampling, with XII IPA Al-Qalam as the experimented class and XII IPA Al-Furqan as the controlled class in the academic year of 2020/2021. Data collection was done by creative thinking skills instrument test, which consisted of 5 essay questions. Data were analyzed by using SPSS 25.0 for windows on normality, homogeneity, and N-gain test. Learning outcomes data of both classes were normally distributed and homogenous. Based on the result, the average score of the pretest and posttest of the controlled class were 39.2 and 70.7, while the average scores of the pretest and posttest of the experimented class were 49.0 and 80.2. Data analysis was done by using t test, and it resulted that t_{count} was 2.439, while t_{table} was 2.009 or $t_{count} > t_{table}$ and the significance was (0.01) < 0.05 meant that there was a significant effect of the inquiry model towards students' creative thinking skills if compared to conventional learning. The improvement of creative thinking skills in experimented class gained <g> score of 0.64, whereas the controlled class gained <g> score of 0.51. Inquiry learning assisted by dynamic electric puzzle science tools can increase students' opportunities to engage in inquiry-based activities and develop students' analytical and creative thinking skills.

Keywords: Creative Thinking Skills; Dynamic Electric Puzzle; Inquiry Learning

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INTRODUCTION

Education is a learning process in which students receive and understand knowledge as part of themselves and then manage it in such a way for the common good and progress. The

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education in question is not about subject matter that is heard when spoken, forgotten when the teacher finishes teaching and only recalled when the test or exam period comes. However, education requires a good, fun, and interesting process for both teachers and students(Anam, 2016). The thinking process is very important to train higher-order thinking skills, one of which is critical thinking, one of the thinking skills in 21st-century learning. One of the learning models mandated in the 2013 Curriculum is inquiry (Maryam, Merta, & Artayasa, 2019).

The 2013 curriculum, which was implemented starting the 2013/2014 school year, is a development of the existing curriculum, both the competency-based curriculum initiated in 2004 and the education unit level curriculum in 2006. However, the emphasis on the 2013 curriculum is the existence of improvement and balance of soft skills and hard skills, which include aspects of attitude, skills, and knowledge competencies (Fadilah, 2014).

The problems that exist can be said that the role of educators in choosing the suitable learning model is very influential on student learning outcomes (Anggraini, Syachruddin, & Ramdani, 2020). Many learning models have been developed to overcome problems in education, one of which is the inquiry learning model. The inquiry learning model is student-centred. This learning model emphasizes the process of thinking critically and analytically to find the answer to a problem in question so that students' memories are more profound in the material that the teacher will deliver.

In contrast to the lecture method, students are more involved in the learning process in the inquiry learning model. Students will be more active in the learning process to minimize the level of student tedium. Moreover, in the inquiry learning model, students memorize the material presented and make observations to understand the material studied comprehensively. Based on this explanation, the Inquiry Learning Model can be used as a solution to improve student learning outcomes (Suprayanti, Ayub, & Rahayu, 2017).

The inquiry learning model is developed for students to find and use various sources of information and ideas to improve their understanding of a particular problem, topic, or issue. This model requires students to be able not just to answer questions or get the correct answer. This model requires students to carry out a series of investigations, explorations, searches, experiments, searches, and research (Abidin, 2014) to achieve learning objectives optimally. Teachers are required to conduct learning activities through experiments for students using learning media.

Learning media has a very strategic function in learning. That is because many students do not understand the subject matter delivered by teachers or the formation of competencies given to students due to the absence or lack of optimal learning media empowerment in the teaching process (Winarto, 2020). While the functions of learning media, according to (Suryani & Leo, 2012) are "(1) a tool to create an effective teaching and learning situation, (2) an integral part of the overall teaching and learning situation, (3) laying the concrete foundations of teaching and learning since abstract concepts could reduce the understanding of verbalism, (4) arouse students' learning motivation, (5) enhance the quality of teaching and learning ". In line with the experts' opinions above, the results of (Darmawan, Reffiane, & Baedowi, 2019) stated that puzzle learning media was able to increase student learning concentration. Relevant research

(Rendra & Wulantari, 2019) developed puzzle learning media to improve learning outcomes.

The basic ability to work scientifically expands the scientific method, which is applied in scientific learning or daily life. The inquiry learning model is research-based learning in which students find the answer to problems they face on their own (Sanjaya, 2013). Inquiry is a process to get information by observing or experimenting to find answers or solve problems by thinking logically.

According to Gulo (Umami & Jatmiko, 2013), the inquiry learning model is a series of learning activities that involves students finding and investigating systematically, critically, logically, and analytically to formulate their findings. Inquire contains higher-level mental processes, such as formulating problems, designing and carrying out the experiment, collecting and analyzing data, making a conclusion, being an objective, honest, curious, open person, and so on. The research result (Kurniawati & Diantoro, 2014; Umami & Jatmiko, 2013) found that the inquiry learning model could improve learning outcomes, conceptual understanding, and creative and critical thinking skills.

The rapid development of science and technology emphasizes that someone be able to improve his self-quality. One of the aspects to focus on is creative thinking skills. An effort to develop creative thinking skills is started from the learning process in class. Inquiry learning increased students' opportunities to participate in the research-based activity and develop their analyzing and thinking ability (Derlina & Mihardi, 2015). Creative thinking skills are built up by the concepts rooted in students' self wherein those concepts and principles are applied.

It becomes a task for teachers to innovate in learning to create qualified learning and help students improve their creative thinking skills. One of the things teachers can do is use the learning media to support learning in class (Nurrita, 2018). To deliver physics more interestingly, the teacher must have the ability to develop a method or model and the use of learning media to attract students' interest, and learning goals can be achieved.

Media could help teachers deliver information, feedback, and positive responses from students, improving learning motivation and increasing students' attention and concentration in studying (Wahyuni & Taufik, 2016). The existence of media in learning science has an essential role. Science topic material, which is hard to show, abstract, microscopic, and hard to explain in words, will be easier to be delivered and enjoyable for students.

As explained that learning media was everything, both physically and technically, that helps teachers make it easier to convey subject matter to students to facilitate the achievement of learning objectives formulated (Adam & Taufik, 2015). The role of learning media in the learning and teaching process is very important to be carried out by educators today because the role of learning media can be used to channel the sender's message to the recipient, and learning media can also help students to explain something conveyed by educators with the use of the tools, teachers and students can communicate more steadily and lively, and their interactions are multi-directional. Media contains messages as learning stimulants, and it can foster learning motivation so that students do not get bored in achieving learning goals (Sanjaya, 2013).

Darmawan, Reffiane, & Baedowi (2019) stated that learning media with puzzles could increase students' learning concentration. Puzzles could improve the ability to work in groups, improve

children's ability to recognize a shape, train and improve children's analytical potency of a problem (Jamil, 2016). Media use to get direct experience can be done by using actual objects or practical tools in laboratory activities. Learning experiences can also be obtained by utilizing media in the form of imitation objects that resemble real objects, such as props, pictures, videos, and computer simulations through virtual labs.

Puzzle media/props are exciting teaching aids that can support the learning process because puzzle media can increase students' interest in learning physics (Prajayanti, Harmayetty, & Kusnanto, 2017). Various shapes, sizes, pictures, and pieces on the puzzle media are exciting for students to arrange, assemble and match the shape of the puzzle pieces in place.

The fundamental difference from the model developed in this study was including dynamic electric puzzle science tool-assisted learning into the inquiry stage to develop intellectual skills and other skills. This study aimed to analyze the effect of dynamic electric puzzle science tool-assisted inquiry learning on students' creative thinking skills compared to conventional learning.

METHOD

The research type in this study was quasi-experiment with a control group pretest-posttest design. The population was students at XII grade who were registered in the academic year of 2019/ 2020. The samples were students of XII IPA Al-Qalam as the experimented class and XII IPA Al-Furqan as the controlled class. The XII IPA Al-Qalam as the research object were as many as 27 students, while XII IPA Al-Furqan consisted of 25 students.

The research planning design is shown in Table 1.

Table 1 Research Design

Class	Pretest	Treatment	Posttest
A (Experiment)	O	X	O
B (Control)	O		O

Test arrangement began with formulating a questioning scheme that included basic competence, measured indicators and the assessment score, question items and the answer key, and scoring rules for each item. The creative thinking skill test instrument was used for pretest and posttest.

The test instrument used was a written test in the form of an essay whose formulation was based on indicators of Creative Thinking Skills in the learning to be achieved. The design of comprehension test questions was guided by Bloom's taxonomy which has been revised. A person's ability to succeed in life, especially to solve the life problems he faces, is determined by his thinking skills (Garrison & Archer, (Jufri, 2013).

The creative thinking skills test used essay questions that referred to the indicators of creative thinking skills (Greenstein, 2012). These indicators include curiosity (showing curiosity), fluency (generating several ideas), originality (showing new ideas that are unique or unusual), elaboration (presenting ideas in detail), imagination (generating new ideas or products), and flexibility (show ideas with many variations or possibilities). The rubric of student answers on each test item ranged from 0 to 6 (Chin & Siew, 2015).

RESULT AND DISCUSSION

The study results were descriptions of the results on the initial and final tests using the homogeneity test, normality test, hypothesis testing (independent sample t-test) and n-gain test. The results of the recapitulation of initial test scores for the controlled class and experimented class can be seen in Table 2.

Table 2 Pretest Data of Students' Critical Thinking Skills

Data	Class	
	Experiment	Control
Minimum	32	8
Maximum	68	60
Mean	49.03	39.20
Deviation standard	9.3869	12.220

The results of the recapitulation of final test scores for the controlled class and experimented class can be seen in Table 3.

Table 3 Posttest Data of Students' Critical Thinking Skills

Data	Class	
	Experiment	Control
Minimum	60	60
Maximum	96	84
Mean	80.29	70.72
Deviation Standard	6.9216	7.6350

Inquiry is a process of asking questions and finding answers to scientific questions. Scientific questions are questions that direct the investigation to the object of the question. In other words, inquiry is a process to obtain information by observing and or experimenting to find answers or solve problems to questions or problem formulations by using critical and logical thinking skills (Mahmudatusaadah, 2011) in scientific research. Then it is hoped that it can foster and develop curiosity in students, develop intellectual abilities in inductive thinking, research abilities, the ability to argue, and develop theories.

The learning model developed in this study was the inquiry learning model. The results showed that dynamic electric puzzle science tool-assisted inquiry learning was very useful with the experimental method. The results had the advantage in which the science tool used was a dynamic electric puzzle in inquiry learning, which could directly assess students' initial knowledge in dynamic electric and students' skill after they experimented.

Practicality and effectiveness were assessed using model implementation sheets, Lesson Plans, and Student Activity. The initial stage of this research was to give pretest to students in the controlled class and experimented class to determine the student's initial abilities. The pretest questions tested were in the form of 5 essay questions. After being tested for homogeneity and normality, both classes had initial abilities. The results of the normality test for the controlled class obtained a significant probability value for the pretest value of 0.200 and the posttest value of 0.072, and it can be concluded that the Creative Thinking Skills data before and after the treatment was normally distributed because the probability value was significant > α (0.05).

Normality test data of the experimented and controlled group for creative thinking skill variable was obtained using Kolmogorov-Smirnov (KS-Z) analysis with a significant rate of (α) = 0.05. Normality test data in the experimental and control groups for the Creative Thinking Skills variable can be seen in Table 4.

Table 4 Normality Test Result

Category	Kolmogorov-Smirnov	
	Sig.	Conclusion
Experiment		
Pre	0.200	Normal
Post	0.089	Normal
Control		
Pre	0.200	Normal
Post	0.072	Normal

The homogeneity test was done using the Levene Statistic method with a significant rate of α = 0.05. By using the F test, the result of the homogeneity test is as seen in Table 5.

Table 5 Homogeneity Test Result

Levene Statistic	**df1**	**df2**	**Sig.**

2.095	1	48	.154
4.000	1	52	.051

The homogeneity test analysis result showed that F counted score for the experimented class was 4,000, whereas the F table score was 4,027. Because F counted (4,000) < F table (4,027), then it can be concluded that the data of experimented class have a similar variance (homogeny). The F counted score for the controlled class was 2,095, whereas the F table was 4,043. Because F counted (2,095) < F table (4,043), then it can be concluded that the data of the controlled class has a similar variance (homogeny).

Learning activities in the experimented class were given treatment in the form of an inquiry learning model, and the controlled class remained with the originally applied learning in schools. After the learning process was complete, students were given post-tests in both classes to determine the final ability after being given treatment. After being tested for homogeneity and normality, both classes had the final ability to be homogeneous and normally distributed. The level of influence of the inquiry learning model was supported by an increase in students' creative thinking results with an average N-gain value both classically and based on indicators of creative thinking skills.

The statistical analysis of the homogeneity test showed that the experimented class and the controlled class were homogeneous. The data processing results showed that the experimented and controlled class had a similar creative thinking skill. After learning was applied in the experimented and controlled classes, the students' average pretest and posttest scores for the creative thinking skill variable were obtained.

Students' responses to creative thinking skills test questions were analyzed for each question and each related indicator of creative thinking skills. There was a change in the percentage of creative thinking skills obtained from the students' pretest and posttest.

The N-gain test was done to measure the improvement of ability classically. The data used was pretest and posttest data of students' creative thinking skills.

The criteria of normalized N-gain for each indicator of creative thinking skill were analyzed to know the improvement of each indicator. The results are as shown in Table 6.

Table 6 Criteria of Normalized N-gain on Experimented and Controlled Class

Class	**N-Gain**
Experiment	0.60
Control	0.51

Based on the data presented in Table 6, it was found that there was an increase in the score of Post group both in the experimented and controlled class. The N-gain for the experimented class was 0.60, which was included in the medium category and the controlled class was 0.51 included in the medium category.

The normalized N-gain criteria for each indicator of creative thinking skills was calculated to determine the magnitude of the increase in each indicator. The calculation results are presented in Table 7.

Table 7 N-Gain per Indicator

Indicator	**N-Gain**	
	Control	**Experiment**
A (Flexibility)	0.42	0.59
B (Flexibility)	0.51	0.61
C (Flexibility)	0.45	0.59
D (Fluency)	0.46	0.59
E (Fluency)	0.46	0.56

The results of the N-gain value showed an increase in the experimented class, which was higher than the controlled class. This shows that the influence of the inquiry learning model can be significantly more effective in

improving students' creative thinking skills than conventional learning.

The homogeneity test aims to know whether some of the data population variances are the same or not. If the population variance is the same, it can be said to be homogeneous. Homogeneity testing was carried out using the Levene Statistic method with a significance level of $\alpha = 0.05$. By using F test, the result of the homogeneity test is shown in Table 8.

Table 8 Creative Thinking Skill T-test on Experimented and Controlled Class.

Test Score	t-test	
	t	Sig.(2-tailed)
Equal Variances assumed	2.439	.018
Equal Variances not assumed	2.470	.017

From the difference test with t-test method, the value of t counted was 2.439 with sig value of 0.018. For df 50, the t table score is 2.009. Because t counted (2.439) > t table (2.009) and the sig were (0.018) < 0.05, then Ha is accepted. It means that the average score of experimented class students' posttest is generally higher than that of controlled class. Therefore, based on the hypothesis test, it can be concluded that there was a difference in creative thinking skill average score between the students who used dynamic electric puzzle science tool-assisted inquiry learning in experimented class and the students in controlled class.

The inquiry learning model provides opportunities for students to maximize their learning activities. The functions and duties of teachers are only as facilitators and mediators in learning. Teachers must be able to create learning that can actively involve students in every learning activity. Students' activeness in the learning process will create an intensive interaction between teachers, students, and the subject matter. This will create a conducive learning atmosphere and allow each student to engage their abilities optimally so that in learning, students will be able to improve their creative thinking skills.

Through the steps applied in the inquiry learning model, students can understand the material more easily because, in the process, it involves the environment around them and invites students to do physical activities that make the learning atmosphere more enjoyable. The use of the inquiry learning model provides the opportunity to work independently to find something new because inquiry learning emphasizes discovery learning with the teacher's role as a companion, not a direct role as a resource in collecting facts, formulating hypotheses, and drawing conclusions; students build their knowledge.

The N-gain value, which is included in the high category, states that the inquiry-based learning tools developed can improve students' creative thinking skills. Relevant research suggested the characteristics of creative children were that they held firmly to their convictions and beliefs and dared to express them; had a high curiosity; independent in thinking and in giving consideration (Munandar, 2014).

Students' creative thinking ability was assessed from the results of the posttest score, which of course, the value obtained by students was very closely related to the learning experience that has been passed from the first meeting to the fourth meeting based on the assessment of the activities carried out by each student and the psychomotor skills of students which were always explored in each lesson so that students' thinking skills continue to be honed and trained in each lesson.

Learning is a process to help thinking skills. Thinking skills are one aspect of life skills that need attention and be developed through the educational process. A person's ability to be successful in life, especially as an effort to solve the problems he faces, is determined by his thinking. Learning how to think well emphasizes the process of seeking and finding knowledge through interactions between students as individuals and the surrounding environment. Concerning science lessons, inquiry and thinking are two things that are closely related to each other, and it is recommended to facilitate their development through the learning process.

Learning media can enhance students' learning process, in which teaching materials will have a clearer meaning so that they can be better understood by students and allow students to master teaching objectives for the better. For this reason, it can be interpreted that

the mastery of learning media (props) is closely related to the stages of thinking because through learning media, abstract things can be concreted, and complex things can be simplified. The use of teaching aids for learning outcomes will be long-lasting for students to remember so that the lesson has a high value.

Puzzle props using the demonstration method in learning Physics, Dynamic Electricity material in class XII science is shown in Figure 1 and Figure 2. Part Figure 1 ohm resistance circuit, Figure 2 for the parallel series circuit.

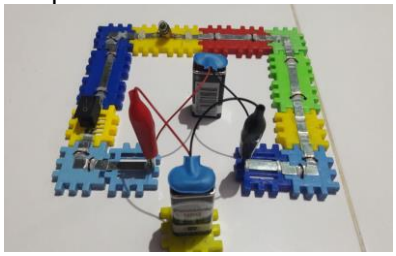

Figure 1 Ohm's Law Circuit using Dynamic Electric Puzzle

Puzzle media is a tool to optimize the learning process by playing and discussing (Sari & Hidayat, 2017). Puzzles improved students' ability to recognize geometric shapes (Elan, Muiz & Feranis, 2017). Puzzle learning media can increase students' interest in learning physics subjects (Yuliani, 2018).

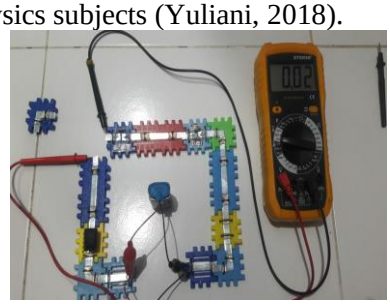

Figure 2 Series-Parallel Resistor Circuit using Dynamic Electric Puzzle

Relevant research suggests that "learning media can be understood as anything that can convey or distribute messages from sources in a planned manner so that a conducive learning environment occurs where the recipient can carry out the learning process efficiently and effectively (Asyar, 2012). Scientific learning is often referred to as a scientific approach or inquiry method, where students carry out all activities to seek and find their answers to something in question (Sanjaya, 2013).

There are five stages in scientific learning: observing, asking questions, collecting data, associating, and communicating (Daryanto, 2014). The ability to work scientifically is important to develop because it allows people who learn and teach it to develop and use higher-order thinking in problem-solving and develop creative thinking embedded in various processes and various sciences. The science learning experience that is expected to be useful for students is to develop science learning by developing basic scientific work skills in the inquiry method.

CONCLUSION

Inquiry learning assisted by dynamic electric puzzle science tools can increase

students' opportunities to engage in inquiry-based activities and develop students' analytical and creative thinking skills. The level of influence of the inquiry learning model was supported by an increase in students' creative thinking results with an average N-gain value both classically and based on indicators of creative thinking skills. Although some have not shown an increase, the change in creative thinking skills showed that the use of inquiry learning assisted by dynamic electric puzzle science tools gave a reaction to students' creative thinking skills.

Further research is needed to use the dynamic electric puzzle science tool-assisted inquiry learning for different subjects. From the various discussions described, conclusions can be drawn and interpreted that the inquiry learning model assisted by student activity sheets can improve students' creative thinking skills.

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REFERENCE

Abidin, Y. (2014). *Desain sistem pembelajaran dalam konteks kurikulum 2013*. Bandung: Refika Aditama.

Adam, S., & Taufik, M. (2015). Pemanfaatan media pembelajaran berbasis teknologi informasi bagi siswa kelas x sma ananda batam. *Computer Based Information System Journal*, *3*(2).

Anam. (2016). *Pembelajaran berbasis inkuiri*. Yogyakarta: Pustaka Pelajar.

Anggraini, B. N., Syachruddin, & Ramdani, A. (2020). Pengaruh penerapan model pembelajaran inkuiri terhadap hasil belajar peserta didik tentang sistem gerak. *Jurnal PIjar MIPA*, *15*(1), 32.

Asyar, R. (2012). *Kreatif mengembangkan media pembelajaran*. Jakarta: Gaung Persada Press.

Chin, M. K., & Siew, N. M. (2015). The Development and validation of a figural scientific creativity test for preschool pupils. *Creative Education*, *6*(12), 1391.

Darmawan, L. A., Reffiane, F., & Baedowi, S. (2019). Pengembangan media puzzle susun kotak pada tema ekosistem. *Jurnal Penelitian Dan Pengembangan Pendidikan*, *3*(1), 14. https://doi.org/10.23887/jppp.v3i1.17095

Daryanto. (2014). *Pendekatan pembelajaran saintifik kurikulum 2013*. Jakarta: Gava Media.

Derlina, & Mihardi, S. (2015). Implementasi model pembelajaran inquiry training dalam pembelajaran fisika untuk meningkatkan kemampuan berpikir formal siswa. *Jurnal Pendidikan Fisika Indonesia*, *11*(2), 162–169.

Elan Muiz, D. A., & Feranis. (2017). Penggunaan media puzzle untuk meningkatkan kemampuan mengenal bentuk geometri. *Jurnal Paud Agapedia*, *1*(1), 66–75.

Fadilah, M. (2014). *Implementasi kurikulum 2013 dalam pembelajaran SD/MI, SD/MTS, dan SMA/MA*. Yogyakarta: Ar-Ruzz Media.

Greenstein, L. (2012). *Assesing 21st century skills a guide to evaluating mastery and authentic learning*. California: Corwin.

Jamil, S. (2016). *Permainan cerdas & kreatif*. Jakarta: Penebar Plus.

Jufri, W. (2013). *Belajar dan pembelajaran sains*. Bandung: Pustaka Reka Cipta.

Kurniawati, I., & Diantoro, M. (2014). Pengaruh pembelajaran inkuiri

terbimbing integrasi peer instruction terhadap penguasaan konsep dan kemampuan berpikir kritis siswa. *Jurnal Pendidikan Fisika Indonesia*, *10*(1), 36–46.

Mahmudatusaadah, A. (2011). Pendekatan inkuiri-kontekstual berbasis teknologi informasi untuk meningkatkan keterampilan berfikir mahasiswa. *Journal Innovation of Vicational Technology Education*, *7*(2), 115–130.

Maryam, K., Merta, I. W., & Artayasa, I. P. (2019). Pengaruh model pembelajaran inkuiri terhadap keterampilan berpikir kritis siswa kelas xi mia man 2 mataram. *Jurnal PIjar MIPA*, *14*(3), 154–161.

Munandar, U. (2014). *Pengembangan kreativitas anak berbakat*. Jakarta: Rineka Cipta.

Nurrita, T. (2018). Pengembangan media pembelajaran untuk meningkatkan hasil belajar siswa. *Jurnal Ilmu-Ilmu Al-Quran,Hadist,Syari'ah Dan Tarbiyah*, *3*(1), 171.

Prajayanti, D., Harmayetty, & Kusnanto. (2017). Jigsaw puzzle improve fine motor abilities of upper extremities in post-stroke ischemic clients. *Jurnal Ners*, *12*(1), 142–150.

Rendra, N. T., & Wulantari, N. W. (2019). Media pembelajaran puzzle untuk meningkatkan hasil pengetahuan ipa. *indonesian Journal Of Educational Research and Review*, *Vol. 2 No.*(P-ISSN: 2621-4792, E-ISSN: 2621-8984), 354–362.

Sanjaya. (2013). *Strategi pembelajaran berorientasi standar proses pendidikan*. Jakarta: Kencana.

Sari, S., & Hidayat, R. Y. (2017). Pengembangan keterampilan berpikir kreatif siswa pada praktikum jenis-jenis koloid: pendekatan sainstifik. *JTK (Jurnal Tadris Kimiya)*, *1*(1), 32–37. https://doi.org/10.15575/jta.v1i1.1155

Suprayanti, I., Ayub, S., & Rahayu, S. (2017). Penerapan model discovery learning berbantuan alat peraga sederhana untuk meningkatk aktivitas dan hasil belajar siswa kelas vii smpn 5 jonggat tahun pelajaran 2015/2016. *Jurnal Pendidikan Fisika Dan Teknologi*, *2*(1), 30.

Suryani, & Leo, A. (2012). *Strategi belajar mengajar*. Yogyakarta: Ombak.

Umami, R., & Jatmiko, B. (2013). Penerapan model pembelajaran inkuiri dengan pendekatan sets(science, environment,technology and society) pada pokok bahasan fluida statis untuk meningkatkan keterampilan berpikir kritis siswa kelas xi sma negeri 1 gedangan. *Jurnal Inovasi Pendidikan Fisika*, *2*(3), 61–69.

Wahyuni, R., & Taufik, M. (2016). Pengaruh model pembelajaran inkuiri terbimbing dengan metode eksperimen terhadap hasil belajar fisika siswa kelas xi ipa sman 2 mataram. *Jurnal Pendidikan Fisika Dan Teknologi (*, *II*(4), 2407–6902.

Winarto. (2020). Pengembangan media student worksheet ipa berbasis pendekatan inkuiri terbimbing. *Jurnal Kajian Pendidikan Sains*, *6*(1), 101–112.

Yuliani, R. (2018). *Pengembangan media pembelajaran puzzle fisika untuk meningkatkan penguasaan materi dan minat belajar fisika peserta didik sma*. Universitas Negeri Yogyakarta.