INKUIRI: Jurnal Pendidikan IPA
Volume 13, Number 1, 2024 pp. 36-41
P-ISSN: 2252-7893 | E-ISSN: 2615-7489
DOI: 10.20961/inkuiri.v13i1.80289

Implementing Science Creativity in Junior High School Students Using A Pirporsal Learning Model on Energy Resources

Lela Nurika[1], Kiki Septaria[2*], Sri Setyannigsih[3]
[1,2,3] *Department of Science Education, Faculty of Teacher Training and Education, Universitas Islam Lamongan, Jl. Veteran No. 53A, Lamongan 62211, Indonesia*
[1]lelanurika@unisla.ac.id, [2*]kikiseptaria@unisla.ac.id, [3]srisetyaningsih@unisla.ac.id

ARTICLE INFO

Article history:
Received 8 November, 2023
Revised 27 December, 2023
Accepted 29 January, 2024
Published online 28 February, 2024

Keywords:
Scientific Creativity; Pirposal; Energy Resourse; Science Education

ABSTRACT

It is vital to foster scientific creativity in Indonesian students as a result of a combination of project-based learning, simulations, and group discussions for students who wish to find innovative solutions to challenges. The purpose of this study is to determine if the proposal learning model can improve students' scientific creative skills in the field of electrical energy. This pre-experimental study used a one-group pretest-posttest design and was conducted at state junior high schools with a sample of 60 students from a student population of 176. Data gathering methods include observation and tests, and data analysis methods include learning implementation, N test -Gain, and t-test with the assistance of SPSS version 27 software. The findings of this study show that the pirposal learning model is implemented with an average observation score in the favorable category, then there is a significant influence between the pirposal model on students' scientific creativity with a t test significance value of 0.000, and there was an increase in the ngain test in the high category.

1. INTRODUCTION

Science learning is a learning bundled in which natural events are studied scientifically. Science learning may produce goods, skills, and even scientific attitudes as a result of examining a natural phenomenon. The science learning process necessitates a mix of procedures and abilities, one of which may be achieved through the use of already defined learning techniques, learning models, and even learning methods by a teacher. Science education covers a wide range of natural phenomena and current concerns that are relevant to someone. The worldwide issue that is now being explored is the absence of students' creative talents in developing new scientific ideas or critical views about diverse situations (Diniya et al, 2021). In overall, Indonesian students' scientific inventiveness talents remain below average, with a score of less than 100. Students' comprehension of scientific creativity is also still unsuitable due to a lack of innovative talents; therefore, students are less able to critically produce new ideas (Riwayani et al., 2019).

In reality, via the deployment of student-centered learning methods, students' scientific creativity may be nurtured from an early age, particularly in science topics that demand creative solutions to solve issues in nature that have an influence on human existence. Based on observations made during the learning process in class VII at State Junior High School (SMPN) 1 Sugio on August 23, 2023, learning is teacher-centered since instructors impart more theory than pupils who dig out knowledge to develop concepts. Aside from that, observations on the achievement of results (mid-semester exams and final semester exams) from science learning were made, and it was discovered that students in classes 7A, 7B, 7C, 7D, 7E, 7F, and 7G in science subjects were still below the minimum requirements expected by the teacher, specifically 75, where the average student score in this subject is below 60. This suggests that students' cognitive capacities and capabilities in science disciplines are not at their peak. The results of the Daily Tests (UH) for class 8 semester 1 students in the previous year, specifically 2021, likewise revealed that their achievements were still below par. Several Basic Competencies (KD) in electrical energy material demand extra attention, such as creating works or models that employ electrical energy. Observations of the behavior of science teachers at this school were also made in this study, where there were deficiencies in the use of strategies used by teachers in carrying out the learning process, resulting in students not being able to be active independently in learning and developing their knowledge.

The pirposal learning model is one of several learning models that have been designed to improve student conduct. The Pirporsal Learning paradigm is a learning paradigm that involves firsthand observation or investigation in order to present and ask questions about a scientific event and to conclude or make ideas (Wells j 2012). The Pirporsal learning paradigm necessitates a STEM approach that includes reflection, research, and communication (Nurizzati, 2019). The pirposal learning paradigm is ideal for developing students' scientific creativity, especially while studying electrical energy. Students in this proposed learning model would be directed to conduct direct observations or research, allowing them to create questions based on their views and then deduce conclusions or make recommendations relating to scientific phenomena. This technique is also predicted to increase the development of scientific capabilities, such as process skills, creative and critical thinking abilities, and instilling scientific qualities in students, in the framework of integrated science learning. (Devi, 2018).

This recommended learning model is expected to be able to develop students' scientific creativity, where scientific creativity is defined as a person's ability to produce, create, and provide new ideas in the face of problems, and something new can be in the form of objects, ideas, ideas, models, strategies, and so on that can be useful or valuable to themselves and others (Ismaniar & Hazizah, 2018). Scientific Creativity Indicators Using various indications and explaining the indicators of creative thought in depth, such as flexibility, fluidity, originality, and Elaboration.

. According to earlier study that is pertinent to this research, research from Rohimatul Misni (2022) shows that media loss sections that apply the stem method can boost student creativity. According to Nuraini (2020), there is an improvement in knowledge of electrical power material during the learning process as a result of greater learning on Energy and Electrical Power material utilizing the STEM approach. Based on the concerns outlined above, study into the implementation of the pirposal learning model and its influence on the development of students' scientific creativity, particularly in the context of electrical energy material, is required. It is envisaged that the findings of this study would contribute to boosting students' scientific creativity in comprehending electrical energy material. Students will be better aware of the need of using electrical energy in the context of household and environmental demands as a result of this.

2. METHOD

This is a quantitative study that employs a pre-experimental design technique with a one-group pretest-posttest design. This study was conducted at Sugio 1 State Junior High School, with a population of 176 students in class VII and a sample size of 60 students. It involved two classes, namely classes 7A and 7B, with a total of 60 students. This study was carried out during the even semester of the 2022/2023 school year, from February to March 2023. In this study, data was collected using observation, cognitive tests, and creativity tests, as well as research tools in the form of learning implementation observation sheets and cognitive and scientific creativity test sheets.

Methods for data analysis are utilized in this investigation, which will later be obtained from the results of this research and analyzed again using learning implementation, n-gain test, and t-test analysis techniques, which will begin with a data suitability test by two experts, namely a language expert and an expert. The content and percentage will be computed, as will the percentage of feasibility tests have passed. The verification of test data and other data gathered throughout the research will entail assessing learning implementation using a Likert scale developed from Segening et al. (2022). The collected data will next be evaluated using the N-gain and t tests in SPSS version 27.

3. FINDING AND DISCUSSION

3.1. Validation Outcomes

The research instruments were validated by experts, with the Learning Implementation Plan receiving a score of 67.5% in the good category, the LKPD receiving a score of 79.5% in the good category, the cognitive sheet receiving a score of 85% in the Very good category, the Observation Sheet receiving a score of 71.5% in the Good category, and the Creativity Test scoring 82% in the Very Good category.

3.2. Finding out Application

The implementation of the Pirposal learning model was examined using an observation sheet instrument and two observers. Evaluation of implementation occurs throughout the learning process, from start to finish, and includes various observed features that have been stated in the observation sheet. Table 1.1 shows the average assessment of this learning's application.

Table 1. Average Learning Implementation

Observed aspects	Assessment Percentage		Score	Predicate
	O1	O2		
Introduction	75	75	75	Good
Core	85	85	85	Very good
Closing	75	75	75	Good

O1= Observer 1, O2= Observer 2

Table 1.1 illustrates that the mean score for the evaluation of learning implementation using the Pirporsal learning model is 75 for the introduction section, 85 for the core section, and 75 for the concluding section. Overall, the average evaluation of learning implementation using the Pirporsal learning model is 78, which is in the very good category. The graph below contains extra details regarding the typical realization of Pirporsal in this course.

According to table 1, the average performance of the learning process using the pirposal model is 78, indicating that learning implementation is in the good category. Obtaining strong criteria for this learning implies that students engage in active learning and do not rely on the instructor as the primary source of knowledge, but instead rely on other sources such as looking for their own data, talks with friends, and others. Constructivist learning theory states that students' knowledge may be built by getting information little by little and compiling it themselves, but students are also aided by the instructor in obtaining the necessary information.

Teachers in learning evaluate all student learning activities during the learning process in order to assess the acquisition of knowledge or skills given in accordance with learning objectives. This enables instructors to discover and provide specific examples of how to apply learning theories to the information that will be provided to students at each level of learning (Valentino, 2022). Excellent learning may lead to a growth in students' cognitive abilities and soft skills, but learning must be based on student actions.

Students' creativity was tested using pre-tests and posters in this study, in addition to the execution of the learning concept. The following table shows the results of a t-test analysis using SPSS software version 27:

Table 2. Paired Sample Test of Class A Science Creativity T-test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRE TEST – POST TEST	-22.667	22.561	4.119	-31.091	-14.242	-5.503	29	.000

Table 3. Paired Sample Test T-test Science Creativity Class B

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRE TEST – POST TEST	-20.633	20.178	3.684	-28.169	-13.099	-5.601	29	.000

According to tables 2 and 3, the pirposal learning paradigm may considerably improve students' scientific creativity in classes A and B. The pirposal syntax, which continues to involve pupils in receiving knowledge through the actions carried out, has an impact on learning (Morgan, 2022). Problem identification, ideation, investigation, prospective solution, optimization, solution evaluation, changes, and learnt consequences are the syntax used in the proposal (Henze, 2021). Students may enhance their creativity through the ideation process, which involves brainstorming for ideas linked to energy transformations and energy sources that cannot be swiftly refreshed in order for life's energy demands to be addressed.

Following that, in the potential solution phase, students will explore for alternate alternatives that allow them to rapidly achieve green energy without polluting the environment (Erlina,, 2022). Following that, the ideas and solution possibilities will be explored, assessed, and one will be picked to identify the best alternative solution to employ in energy conversion (Dewi, 2019). Students will talk with other students and the teacher's function as a bridge and guide throughout learning so that students have greater flexibility in thinking and looking for knowledge (Rosidah, 2021). In addition to the T test, N-gain testing was performed to measure the growth in students' creative ability in each class, as shown in the table below:

Table 4. N-Gain Results for Class A Students' Science Creativity

	N	MINIMUM	MAXIMUM	Mean	Std. Deviation
N-GAIN SCORE	30	-67	.97	.376258	.44027
N-GAIN PERSEN	30	-66.67	96.67	37.6155	44.02731
Valid N (listwise)	30				

Table 5. N-gain Results for Class B Students' Science Creativity

	N	MINIMUM	MAXIMUM	Mean	Std. Deviation
N-GAIN SCORE	30	-14.00	23.20	8.9347	9.81945
N-GAIN PERSEN	30	-1400.00	2320.00	893.4667	981.94479
Valid N (listwise)	30				

Tables 4 and 5 show the results of the N-Gain test for classes A and B, which were 0.3 and 0.7 with medium and high criteria, respectively. There is an increase and difference in the increase in scientific creativity that occurs because class A has obstacles that have an impact on increasing scientific creativity, such as implementation being hampered because students are taking school exams, whereas class B does not have problems because the exam schedule is different. Student innovation is mostly encouraged in the proposal model syntax, particularly in the research phase (Prasetyo, 2021). Students will be educated to ask questions, examine, and study materials relevant to energy sources in the syntax of this research phase using STEM integration-based learning (Cahyani, 2020). The inquiry tries to gather new information that can be built into science via scientific phases.

The acquisition of new information happens because, during the learning process, students are given the flexibility to voice their thoughts and engage in debates with other students based on the knowledge they have gained in everyday life from other students. Students are encouraged to assess problems in their surroundings and collaborate to identify acceptable solutions (Umam, 2021). This technique allows students to participate in conversations and obtain real-world experience through experiments or instances that are relevant to or in everyday life, which they may use immediately throughout the learning process (Zahroh, 2019).

4. CONCLUSIONS AND RECOMMENDATIONS

The study's findings indicate that learning utilizing the pirposal learning model has a substantial effect on students' scientific creativity as measured by the paired sample t test, as well as an increase in students' scientific creativity as measured by the N-Gain test. This growth in creativity can be noticed in students in classes A and B; however, there are variances in the amount of progress, which may be attributed to various impediments; still, there is still an increase.

5. REFERENCE

Cahyani, A. E. M., Mayasari, T., & Sasono, M. (2020). Efektivitas e-modul project based learning berintegrasi stem terhadap kreativitas siswa smk. Jurnal Ilmiah Pendidikan Fisika, 4(1), 15.

Campbel, (2017) Mengembangkan Kreativitas Siswa dan Dasar- dasar Ilmu Pendidikan, Yogyakarta: Jurnal Pendidikan, 19(1).

Devi, P.K., Herliani, E., Setiawan, P., Yanuar, Y., Karyana, S. (2018). STEM Kementrian Pendidikan dan Kebudayaan SEAMEO Regional Center for QITEP in science.

Dewi, S., & Kelana, J. B. (2019). Meningkatkan Kemampuan Berpikir Kreatif IPA Siswa Sekolah Dasar Menggunakan Model Contextual Teaching and Learning. COLLASE (Creative of Learning Students Elementary Education), 2(6), 235-239.

Diniati et,al (2021) Isu global yang tengah diperbincangkan saat ini, Jurnal Inovasi Pendidikan IPA, 5(1), 45-53.

Erlina, N., Warpala, I. W. S., & Juniartina, P. P. (2022). Pengembangan Alat Peraga 3D berbasis Eco-Friendly melalui Project Based Online Learning untuk Meningkatkan Kreativitas Ilmiah Calon Guru IPA. *Jurnal Pendidikan Dan Pembelajaran Sains Indonesia (JPPSI)*, *5*(2), 177-186.

Henze, I., & de Vries, M. J. (2021). Design-Based Concept Learning: An Introduction. In Design-Based Concept Learning in Science and Technology Education (pp. 3-13). Brill.

Ifni Oktiani, (2017). Kreativitas guru dalam meningkatkan motivasi belajar peserta didik, MI Nurul Amin Wanantirta Paguyangan Brebes Doi: https://doi.org/10.24090/jk.v5i2.1939

Nitaoktifa (2021) Strategi agar siswa lebih aktif dalam mengembangkan pengetahuan secara mandiri, PT. Aku pintar Indonesia. Gren Slipi Tower Jl.S. Parmaan kav 22-24 Jakarta Barat.

Nur izzati et.al, (2019) pengenalan pendekatan STEM sebagai inovasi pembelajaran era revolusi industry ,Jurnal Anugerah 01,02,(84-118)

Morgan, C. E. (2022). Technological and Engineering Design Based Learning: Supporting Graphical Device Comprehension Instruction at the Upper Elementary School Level (Doctoral dissertation, Virginia Tech).

Nurainieni, (2020). *Upaya Meningkatkan Kreativitas Siswa pada Pembelajaran Ipa Berbasis STEM (Sciences, Technology, Eginnering, and Mathematics) Pada Materi Energi dan Daya Listrik*. Jurnal ilmiah, 1(9),1-10

Naswir, M., Haryanto, H., Wati,F. (2017).*Analisis Keterlaksanaan Model Pembelajaran Inkuiri Terbimbing Untuk Materi Sifat Koligatif Larutan Dan Pengaruhnya Terhadap Kemampuan Berpikir Kreatifitas Siswa Kelas Xii Ipa Sma Islam Al-Falah Kota Jambi. Journal of The Indonesian Societyof Integrated Chemistry*,*9*(2),43–51.

Prasetyo, T. I., Handayani, N., Zulfa, A. R., & Alifah, L. N. (2021, March). Development of learning tools based on pirposal model on respiratory and excretion systems materials. In AIP Conference Proceedings (Vol. 2330, No. 1). AIP Publishing.

Riwayani, R., Perdana, R., Sari, R., Jumadi, J. & Kuswanto, H. (2019). Analisis Kemampu Argumentasi Ilmiah Siswa pada Materi Energi: Problem-based Learning Berbantuan Edu-Media Simulation. Jurnal Inovasi Pendidikan IPA, 5(1), 45-53.

Rohimatul Misni (2022) *Meningkatkan Kreatifitas Melalui Metode STEM Berbasis LOOSE PARTS. Fakultas Tarbiyah dan Keguruan,* Lampung: Jurnal Pendidikan, 2(2) 56-64Sri wahyuni (2022) *Meningkatkan Hasil Belajar dan Kreativitas Siswa Dengan Model Pembelajara PICTURE and PICTURE Pada Tema Energi dan Perubahannya, Journal of Mandalika Literature*, 3, No.1 245-342,

Rosidah, A., & Kurino, Y. D. (2021). Pengaruh Model Pembelajaran Predict-Observe-Explain Terhadap Kemampuan Berpikir Kreatif Siswa Pada Mata Pelajaran IPA. Jurnal Pendidikan Dan Konseling (JPDK), 3(2), 150-156.

Segening et al., (2022) *kemampuan komposisi kimia,* semarang: Jurnal Ilmiah Profesi Pendidikan,7(2): 512-518

Tri mulyani (2019) Pada pembelajaran IPA berbasis STEM, salah satu karakteristik yang harus terlihat dalam proses pembelajaran adalah proses desain rekayasa atau Engineering Desain Process (EDP).

Umam, H. I., & Jiddiyyah, S. H. (2021). Pengaruh Pembelajaran Berbasis Proyek Terhadap Keterampilan Berpikir Kreatif Ilmiah Sebagai Salah Satu Keterampilan Abad 21. *Jurnal Basicedu*, *5*(1), 350-356.

Wells, J. & Ernst, J. (2012/2015) Pendidikan STEM integratif. Virginia Tech: Ciptakan Masa Depan, Sekolah Pendidikan. Diperoleh dari www.soe.vt.edu/istemed.

Valentino, (2022) mengidentifikasi serta contoh konkret tentang bagaimana cara penerapan teori pembelajaran yang dapat diterapkan pada materi yang akan disampaikan kepada siswa pada setiap tahapan pembelajaran, journal.uin-susica.ac.id., 4(2), 221-228.

Yuniarti,Widayaningsih, (2018) *Pendidikan kimia jurnal ilmu Pendidikan sosial, sains dan humaniora.* journal.uin-susica.ac.id., 4(2), 221-228.

Zahro, U. S., Ellianawati, E., & Wahyuni, S. (2019). Pembelajaran inkuiri terbimbing untuk melatih kreativitas dan keterampilan berpikir ilmiah siswa. UPEJ Unnes Physics Education Journal, 8(1), 1-7.