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The Effect of Scaffolding and Creative Thinking Skills in an Acid and Base Learning Project on Students' Science Process Skills

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Abstract: Scaffolding is a strategy given by teachers to guide students to successfully complete learning tasks. Teachers may provide either questioning, cueing, prompting, or explaining and is based on students' actual ability. The purpose of this study was to investigate the effect of the scaffolding provision and students' creative thinking skills on students' science process skills (SPS) in a project-based learning (PjBL) about acid and base concepts. A quasy factorial experiment research design was applied to collect data using a pre-validated SPS-observation. An experiment group from SMAN 3 in Jambi City had learnt the concepts using a scaffolding-assisted PjBL while a control group from the same school had learnt it using PjBL without scaffolding. Prior to the learning, creative thinking ability of the students was measured using a questionnaire. Data was then analyzed using a two-way Anova test assisted by SPSS software. The results of analyses showed that there was an effect of the scaffolding and the creative thinking ability on the students' SPS. Potential interaction between those variables was also seen in affecting the SPS. It appears that the the presence of scaffolding and the initial students' ability in creative thinking sinergetically improved the students' SPS.

Keywords; Acid and base; Creative thinking; Project-based learning; Scaffolding; Science process skills

Introduction

Learning process in classroom needs to be carried out by applying various techniques, strategies, approaches, and models. One of the models is the project-based learning (PjBL). It is well known as an effective learning model for improving varied students' learning outcomes. It is already recommended by the Indonesian government to be implemented by teachers in the classroom learning process. The focus of PjBL is on products that students need to make such as videos, power point presentations or reports. In compiling the curriculum, *the designer* prepares academic standards, determines the treatment that can be carried out by students and arranges projects as evidence of increased skills (Cuddihy & Guan in Belland & Evidence, 2017).

The George Lucas Educational Foundation divides six stages of project based learning are; basic questions, designing projects, compiling schedules, monitoring students, testing results and evaluating experiences (Widayanti et al., 2018). In a project-based teaching strategy, the first or introductory stage should begin with a problem or question that will condition students to face the concepts to learn. The discovery process of PjBL involves structuring and transforming information from teacher to students and between students (Demir, 2020).

PjBL has already wellknown as an effective learning model for improving students' science process

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skills (SPS). It is able to make students motivated in learning. It is able to increase creativity to produce a product from a project carried out by students. Besides that, it can also improve students' critical thinking skills through activities to seek information from many sources and materials. This model also invites students to be actively involved in learning and applying the material to a project and is also an innovative student-centered method (Parmani et al., 2019; Bahriah et al., 2017).

Although it has many advantages, in fact this PjBL model has weaknesses in the learning process. The weaknesses are; The number of tools that must be used, Students who have weaknesses in experiments and gathering information will experience difficulties. There is a possibility that students are less active in group work. According to Nawawi, it is caused by various factors including lack of time when students want to solve existing problems. Lack of funds (Parmani et al., 2019). This is in accordance with research conducted by Effendi-Hasibuan et al. (2019) which found that learning barriers to the suggested model for use in the 2013 curriculum have various obstacles such as; lack of time, lack of knowledge, and lack of skills and experience of educators and students. This is also parallel with Quintana et al. (2004) who describe the obstacles that occur to students when managing the science search process and will later find several related problems. According to Bransford, the inability to compile appropriate steps in carrying out activities and coordinating investigations by students. Knapp also adds that students can get distracted by less important managerial tasks.

As described above, the PjBL model is able to train students' science process skills. Siwa et al., (2013) explained that SPS and science attitudes of students can be assessed by project-based learning. The focus of project-based learning lies in concepts that can make students actively involved in project activities in class. Because students are given the opportunity to work independently and construct knowledge and are able to present their findings. Suhanda et al. (2018) explained that SPS aspects can be increased through project-based learning. Because the KPS aspects are interrelated, the observing aspect will have an impact on improving the asking and predicting aspects. Aspects of asking questions and predicting can have an impact on improving aspects of formulating hypotheses and designing experiments. The results of project work can improve skills in applying concepts and communication.

Science process skills according to Özgelen (2012) are scientific thinking skills that are useful in solving problems and formulating the results obtained. Hasanah et al. (2017) explained that science process skills must be aligned with the development of science and technology which is increasingly advanced and is relative. So that educators do not only teach material concepts but are more complex with concrete examples. Toplis and Allen also argue that science skills are a substantive part of the curriculum for developed countries (Hardiyanti et al., 2017). Facts in the field inform that students' science process skills are low. Therefore, to make learning successful, educators must evaluate in improving, modifying and looking for effective models, methods and strategies to apply to students. So that students can interpret the learning process in class.

Student worksheets are an effective strategy for improving science process skills. Aprida et al. (2023) stated that project-based learning (PjBL) which is supported by electronic student worksheets has a positive impact on student learning outcomes. The findings Maulana et al. (2023) also provide positive research results if student worksheets are able to improve science process skills and student motivation.

In addition to the science process skills, project-based learning is also able to train students' creative thinking skills. Creative thinking skills are a major goal of science education, because school graduates who think creatively will make a positive contribution to the personal, social, technological and economic world they will inhabit as adults in the 21st century. However, sufficient emphasis has not been placed on measuring creative thinking skills, particularly in sciences such as chemistry. Creativity is very difficult to define and measure. To estimate the potential for creative thinking, the divergent thinking test is often used. The terms and steps of divergent thinking were discovered by Guilford. There are currently two types of creative thinking measures developed by researchers. The first is a measurement of creative thinking in the general domain; the second is the measurement of a specific domain (Diawati et al., 2017).

Creative thinking skills are defined as skills needed in almost all subjects. Meanwhile, according to Munandar creative thinking is a pattern of thinking that encourages creative products and involves rational and imaginative thinking in solving a problem. The cognitive characteristics of creative thinking are fluency, flexibility, originality, and elaboration (Meiarti et al., 2020). Koray & Koksal's research regarding the application of laboratory-based creative thinking and critical thinking has a significant effect on improving creative thinking skills. Based on factor analysis, Guilford found five characteristics that characterize the ability to think creatively, namely: fluency, flexibility, originality, decomposition, and reformulation (Nuswowati & Taufiq, 2015).

Creative thinking is a skill to develop, discover, or make constructive new combinations based on existing data, information, or elements, with different perspectives that arise as manifestations of the problems they feel, so as to produce something useful. Previous research has shown that creative thinking is influenced by various circumstances, including the extent to which individuals are able to collaborate and are motivated to solve problems. Most of the research shows that there are differences in the results of students' creativity based on how to get achievements when the classroom environment is manipulated (Diawati et al., 2017). The 2015 Global Creativity Index (GCI) International study show that Indonesia's creativity index is still very low with a value of 0.202 which ranks 115th out of 139 participating countries. Therefore, the efforts of educators are needed to be able to improve students' creative abilities. Torrance identified four components of creative thinking indicators that can be applied, namely: *Fluency, Flexibility, Originality,* and *Elaboration* (Trisnayanti et al., 2020). Rahayu et al. explained that the creative ability test will be built using aspects and sub-aspects of divergent thinking. Aspects of fluency, which means producing a large number of answers, flexibility, which means being flexible to generate varied ideas and answers, originality, which means the ability to produce different and unique ideas, and elaboration to generate ideas with details (Megawan & Istiyono, 2019).

Chemistry lesson is one of the materials that can apply the PjBL learning model in class. One of them is in teaching acids and bases, in the 2013 curriculum the skills that students must fulfill are analyzing the pH change trajectories of several indicators extracted from natural materials through experiments. When students have prior knowledge or the prerequisite material from studying acids and bases is complete, then students will not experience difficulties. This acid-base material is a prerequisite material for studying buffer materials, hydrolysis, acid-base titrations, chemical reactions, equilibrium, the nature of matter and solutions as well as stoichiometry (Artdej et al., 2010; Sesen & Tarhan, 2011; Amry et al., 2017).

Facts in the field inform students that they still have difficulty solving problems in acid-base material. This is caused by a lack of knowledge and understanding of the subject matter conveyed by the teacher in class. Yuriev et al. (2017) explained that the process of solving difficult chemical problems by students was caused by a lack of knowledge related to chemical material or basic concepts of chemistry and the poor problem-solving strategy process for the approach taken, causing misunderstandings. The impact that arises from students' lack of understanding causes misconceptions about symbols and formulas and difficulties understanding the context in the material followed by generalizing concepts, and using incorrect problem solving strategies (Yuriev et al., 2017; Parastuti et al., 2016).

This misunderstanding arises because of the characteristics of the chemical itself. Johnstone (2006) explained that there are three characteristics of chemistry, namely symbolic, submicroscopic and macroscopic. Symbols or icons used in chemical equations enter the symbolic aspect. The description of particulates, molecules and matter is included in the microscopic aspect and events that can be directly observed and can be described are included in the macroscopic aspect.

The results of Juleha research found the location of misconceptions that occur in acid-base material, namely; the concept of electrolyte and non-electrolyte properties in acid-base solutions, the concept of acid-base solutions, the concept of strong and weak acids, the strength of acids and the concept of the development of acid-base theory (Juleha et al., 2019).

Recent research conducted by Mubarak et al. (2020) found that some students had not acquired good initial knowledge regarding acid-base concepts such as acid-base theory, strong and weak acid-base concepts and dissociation of strong and weak acids. Educators can also emphasize the role of chemical representation in building students' understanding of conceptual holistic chemistry because they can find and identify problems in learning chemistry.

Teachers can also provide scaffolding assistance to students to overcome problems during the learning process. According to Belland et al. (2017) instructional scaffolding is different from other instructional support strategies and tools. Firstly, scaffolding aims to solve the problem currently being faced, but it can lead to solving subsequent problems independently. Second, unstructured problems can use scaffolding to help solve them. Third, scaffolding functions to improve students' existing abilities and is tied to ongoing ability assessments. Fourth, scaffolding can simplify some elements of the task but still maintain the complexity of the task given. The goal is for students to focus on the problems given and experience meaningful learning from the tasks presented.

Based on the description above, the researchers will look at the interactions that occur between learning models and creative thinking on science process skills. Therefore, to find out the interaction in question, we will apply this model to students of SMA N 3 Jambi City to improve students' KPS in chemistry.

Based on the background above, it is necessary to carry out further research regarding the influence of learning models and creative thinking on science process skills and interactions.

Method

This experimental research aims to determine the direct effect *of* the PjBL model on students' science process skills. Treatment was given intentionally to individuals or groups of individuals in a learning community. The learning community in this study involved a control group and an experimental group. The experimental group that received treatment in this case used the PjBL model assisted by scaffolding, while the control group applied the PjBL model without scaffolding. The scaffolding provided consists of four stages, namely questioning, prompting, cueing and explaining (Fisher & Frey, 2010).

This study used a mixed method with a population of 16 year old students who were in class XI MIPA SMA Negeri 3 Jambi City using two classes. Class selection was selected by random sampling and conducted interviews with teachers to decide which class to use for research. Each class consisted of 36 students and a total of 72 students in the study.

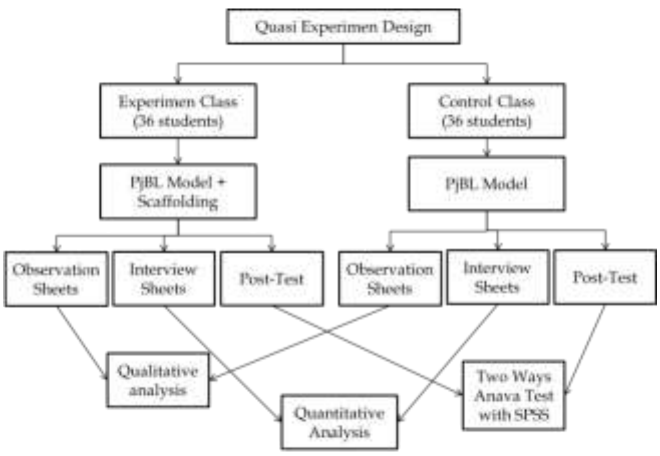

Figure 1. Research design scheme

Instruments

The type of instrument used in this study were observation sheets and interview sheets.

Data Collecting Technique

The observation sheet aims to observe the ability of the science process skills that appear in each syntax of the PjBL model in the project work process, with a rating scale of 1 to 4. Meanwhile, the interview sheet is given to the teacher to find out and identify the use of scaffolding flow whose subject matter is related; learning needs, student and environmental analysis, as well as task analysis, learning objectives, learning sequences, learning strategies, message delivery design, developing learning, practical and efficient.

Data Analysis Techniques

This study uses a mix method. Qualitative analysis was obtained from observations while quantitative analysis was obtained by interviews. The KPS assessment was processed using the Two Ways Anava Test with SPSS and the interviews were processed descriptively.

Result and Discussion

The Effect of Learning Models and Creative Thinking Skills on Science Process Skills

The science process skills (KPS) of students in the experimental and control classes were tested using the Two Ways Anava test. This test is to determine the interaction of the PjBL learning model and creative thinking on student KPS in experimental and control classes. The first step is the results of the data obtained by descriptive testing of Science Process Skills data before and after treatment of experimental and control classes are presented in Table 1 below.

Table 1. The Score of Science Process Skills

Class Code	Creative Thinking Code	Mean	Std. Deviation	N
Experiment	Low	71.3571	5.27122	14
	High	82.8636	2.93250	22
	Total	78.3889	6.91697	36
Control	Low	65.3913	4.85928	23
	High	81.3077	1.70219	13
	Total	71.1389	8.71502	36
Total	Low	67.6486	5.75044	37
	High	82.2857	2.62982	35
	Total	74.7639	8.62276	72

The results showed that the students' SPS score of the experiment class (78.3889) was higher than the score of the control class (71.1389). Similarly, the score of the students' SPS with high creative thinking skill (82.2857) was better than those with the low creative thinking skill (67.6486). This designated an indication that both the treatments (scaffolding provision and creative thinking skill) were effective in improving the students' SPS.

To make sure whether the on-eyes effect was truly significant thus a two-way Anova test was applied. The results can be seen in Table 2. However, to affirm that the test was legally operable thus a homogeneity test was investigated. The result of the test showed that the data were homogenous with significance of p-value = .2 > .05.

Table 2. The Results of Two-way Anova tests

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	4182.933[a]	3	1394.311	86.504	.000	.792
Intercept	381620.918	1	381620.918	23676.072	.000	.997
Learning Model	238.436	1	238.436	14.793	.000	.179
Creative Thinking Skills	3169.253	1	3169.253	196.623	.000	.743
Model * Creative Thinking Skills	81.957	1	81.957	5.085	.027	.070
Error	1096.053	68	16.118			
Total	407733.000	72				
Corrected Total	5278.986	71				

a. R Squared = .792 (Adjusted R Squared = .783)

Based on Table 2, it can be seen that there were an effect of learning model and creative thinking skill on the students' SPS. The values of sig p-value .000 < .05 each for both variables indicate these findings. This means that the science process skills the students had after the provision of scaffolding was significant.

The Interaction between the Learning Models and Creative Thinking Skills on Science Process Skills

Knowing that both the variables were significant, thus the interaction between these variables needed to be investigated. Data in Table 2 showed that there was an interaction between the Learning Models and Creative Thinking Skills on Science Process Skills. The value of .027 < .05) confirmed this result. It can be concluded that both the variables sinergetically affected the improvement of the students' SPS after the treatmens.

To find out the form of interaction between the use of models and creative thinking on science process skills, the chart below is presented in figure 2.

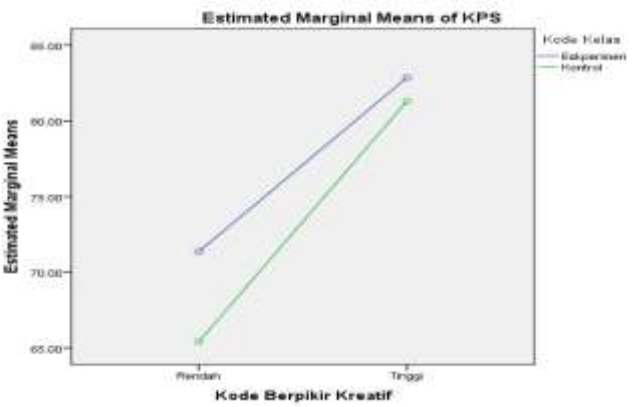

Figure 2. Interaction between the learning model and creative thinking on science process skills

Based on Figure 2, it can be said that there is a significant interaction between learning models and creative thinking on students' science process skills. This fact can be assumed from the slope of the lines which are not parallel. This supported the value of .027 produced by the two-way Anova test presented in table 2 above.

Interaction Process

The interaction process between the project-based learning model and creative thinking is located in each step of the PjBL model. Like step 1 of the basic question here, the educator asks questions to train students' creative thinking skills such as how to make a natural indicator from turmeric? And students answer it with a variety of variations. Furthermore, creative thinking skills are also trained for the 3rd syntax, namely designing projects. This step requires students' creative thinking skills to be able to describe the design they will do accompanied by a description of the steps of the process. Students are also guided to be fluent in working on projects, flexible to other variables found during project work and able to design their own designs and be able to explain in detail and detail.

This is in accordance with Munandar's opinion that creative thinking is a pattern of thinking that encourages creative products and involves rational and imaginative thinking in solving a problem. The cognitive characteristics of creative thinking are fluency, flexibility, originality, and elaboration (Meiarti et al., 2020). One approach that can encourage students to think creatively is problem-based learning and creative problem solving exercises. Additionally, additional methods include developing creative thinking through the application of technology (Nasution et al., 2023).

Koray & Koksal's research related to the application of laboratory-based creative thinking and critical thinking has a significant effect on improving creative thinking skills. Based on factor analysis, Guilford found five traits that characterize creative thinking skills, namely: fluency, flexibility, originality, decomposition, and reformulation (redefinition) (Nuswowati & Taufiq, 2015).

The existence of this creative thinking ability helps students in working on projects that will help to improve science process skills. Like when students practice the KPS indicator ability to predict. This indicator requires analytical skills and flexibility to be able to design projects with originality. Likewise, when students are trained to interpret observations, students will see these observations flexibly which later students will smoothly communicate with their team and submit opinions to the teacher.

Sari et al. (2023) in their research stated that creative thinking skills are very important for students to work on projects effectively. Creative thinking involves the ability to generate new and effective ideas, experiment with alternatives, and evaluate those ideas. This encourages students to use multiple approaches to solve problems, analyze different points of view, adapt ideas, and arrive at new solutions.

Project-based learning can be an effective method for assessing and improving students' creative thinking abilities. This approach allows students to work collaboratively to solve real-world problems, fostering flexibility and creativity. Assessment of creative thinking skills can be done through divergent thinking, which involves generating many possible solutions to a problem (Sari et al., 2023).

Project-based learning (PjBL) can be integrated into science teaching to improve creative thinking and problem-solving skills among students. In science, students can design and conduct experiments, analyze data, and present their findings through a project-based approach (Markula & Aksela, 2022).

This PjBL model trains students to be able to work and think as scientists work. Özgelen (2012) explains that scientific thinking skills are science process skills that are useful in solving problems and formulating the results obtained. Suhanda et al. (2018) on students' responses concluded that project-based learning is able to avoid students from boredom, and has a positive impact on improving observation, communication and applying the concepts they have. Then project-based learning can also improve aspects of science process skills. Each aspect of KPS is interrelated, the aspect of observing will have an impact on improving the aspects of asking questions and predicting. Aspects of asking questions and predicting can have an impact on improving aspects of formulating hypotheses and designing experiments. The results of project work can improve skills in applying concepts and communication.

There is a significant relationship between students' science process skills and their creative thinking skills, as shown by research Darmaji et al. (2022) which states that this relationship is very important in the context of science education, where students need to develop the ability to follow scientific processes and the capacity to think. creative to understand complex concepts and solve problems. This relationship can be useful for teachers and prospective teachers, because it shows that improving students' science process skills can also improve their creative thinking abilities.

Science process skills can be developed in students through various strategies and methods. Some effective ways to improve students' science process skills include: Integration of science process skills in curriculum materials, classroom learning, and assessments. Use of student-centered teaching methods and multiple representation approaches, such as hands-on activities and mind-on activities. Provide explicit instruction or training on science process skills (Gizaw & Sota, 2023). Utilizes simple computer simulations and multimedia resources to support the learning process and encourage discovery skills (Siahaan et al., 2016). Encouraging students to develop scientific attitudes and skills in solving problems through a science process skills approach. Emphasizes the importance of science process skills in understanding the environment and encourages critical thinking (Sufinasa et al., 2023). By incorporating these strategies into science education, teachers can effectively develop students' science process skills, which will help them understand concepts and material better, improve academic achievement, and encourage mental and intellectual processes.

The PjBL model also has other advantages, namely students can improve their abilities, skills and creativity that function to complete and produce projects that are done, can improve critical thinking skills in the process of studying relevant literature and most importantly the PjBL model is able to improve the role of students to be active during the learning process and be able to integrate knowledge into the project being worked on (Parmani et al., 2019; Bahriah et al., 2017).

Below is a picture of the interaction net between the PjBL model and creative thinking on KPS.

Figure 3. Relationship between PjBL model and creative thinking to science process skills

In fact, the ability of students in the classroom for science process skills is still relatively low. There are factors that cause low science process skills, namely low initial science abilities and lack of facilities in the laboratory (Jack, 2013). Before learning acid-base material, students are expected to be able to understand the prerequisite material proposed. The prerequisite materials submitted to students are buffers, hydrolysis, acid-base titration, chemical reactions, equilibrium, the nature of matter and solutions and stoichiometry. When students have initial knowledge related to the requirements that must be known before learning acid-base, they will not experience difficulties (Artdej et al., 2010; Sesen & Tarhan, 2011; Amry et al., 2017).

In chemical materials, misconceptions are still often found, such as those that occur in concepts, properties, equations, acceptor donor principles and energy concepts. The results of Juleha et al. (2019) found the location of misconceptions that occur in acid-base material, namely; the concept of electrolyte and non-electrolyte properties in acid-base solutions, the concept of acid-base solutions, the concept of strong and weak acids, acid strength and the concept of the development of acid-base theory.

There are several misunderstandings about acid-base material that students often encounter. Some of these misconceptions include: Students may not fully understand the theory behind acid-base reactions, resulting in confusion about the properties of acids and bases. Students may believe that only strong acids or bases can conduct electricity, or that the pH value is the only factor that determines the strength of an acid. Students may have misconceptions about the role of ions in acid-base reactions, causing them to view acids and bases differently based on the presence of H or OH ions (Mubarokah et al., 2018). Misunderstandings in acid-base topics can be a challenge in online learning, highlighting the need to address these issues to ensure effective understanding (Djarwo et al., 2023).

Recent research conducted by Mubarak et al. (2020) found that some students have not obtained good prior knowledge related to acid-base concepts such as acid-base theory, the concept of strong and weak acids and dissociation of strong and weak acids. Educators can also emphasize the role of chemical representations in building students' understanding of holistic conceptual chemistry because it can find and identify problems in chemistry learning.

Quintana et al. (2004) describe the obstacles that occur to learners when managing the science search process and will later find several related problems. According to Bransford, the inability to organize appropriate steps in conducting activities and coordinating investigations by learners. Knapp also added that learners can be distracted by managerial tasks that are less important.

The process of solving difficult chemical problems by learners is caused by a lack of knowledge related to chemical materials or basic chemical concepts and a poor problem-solving strategy process towards the approach taken, causing errors (Yuriev et al., 2017). Westbroek et al. (2005) explains that the characteristics of chemistry learning include the use of relevant context, offering content based on need to know, and making students feel that their input is important. These strategies aim to promote meaningful chemistry education and can lead to the design of concrete, empirically based heuristic modules and guidelines for educational design decisions.

The characteristics of chemistry itself are divided into three aspects described by Johnstone (2006), namely symbolic, submicroscopic and macroscopic. The symbols or icons used in chemical equations are included in the symbolic aspect. The depiction of particulates, molecules and matter is included in the microscopic aspect and events that can be observed directly and can be described are included in the macroscopic aspect.

Teachers can help students overcome problems by applying scaffolding as a problem solving tool. Belland et al. (2017) supports that students with problem-centered learning need to be assisted with scaffolding. As interactive support by utilizing the initial knowledge that students have to help them participate in problems beyond their abilities. The abilities that students can later achieve are being able to solve main problems, designing project completion schemes.

Fisher et al. (2010) believe that there are four forms of scaffolding that educators provide to students, namely: Questioning to check understanding, Prompting to speed up students' cognitive processes, Cueing to provide more specific instructions for students' errors or partial understanding, and Explaining. for direct explanation, modeling, and motivation.

The scaffolding mechanism according to Quintana et al. (2004) is that first, the use of scaffolding in science needs to be reviewed, there are two critical thoughts for scaffolding. First, assistance will be given to students to help with difficulties in completing the tasks given. Second, improving process skills and understanding of content comes from the experience gained during the learning process. Representations should focus as tools specifically designed to assist in completing a given task.

Interaction supported by scaffolding can have a positive impact, namely students are able to demonstrate high level skills such as the ability to solve unstructured problems, argue and make in-depth meaning of the material, which is a form of promotion of scaffolding learning outcomes (Belland & Evidence, 2017). Yanti et al. (2023) scaffolding strategies are provided to guide students through key questions to test the ideas, arguments and reasons students produce in order to develop a project. The assistance referred to in this multiple scaffolding strategy is in the form of providing guidance, encouragement, explaining the problem to the steps for solving it, providing examples so that students can grow independently.

Purwanti et al. (2023) stated that the scaffolding strategy in science learning can help the learning process by providing some assistance in the early stages of learning, then reducing the assistance and providing opportunities for students or students to take over greater responsibilities after they are able to do so. themselves, so that students are active in the learning process which is oriented towards equipping students with high-level thinking skills and collaboration skills.

Therefore, it is necessary to carry out continuous treatment to train students' thinking skills by developing student worksheets in accordance with learning objectives. Aprida et al. (2023) stated that project-based learning (PjBL) supported by electronic worksheets has a positive impact on student learning outcomes. Based on research results Maulana et al. (2023), it shows that student worksheets are able to improve science process skills and student motivation. Because chemistry is a subject that has the characteristic of bringing learners to understand basic concepts to complex understanding. The understanding that students have, will later become the foundation for studying chemistry in higher classes or in other words, the concepts in chemistry are hierarchical.

Conclusion

There is an interaction between learning models and creative thinking on science process skills sig 0.017 <0.05. This can be seen in the entire learning process of students having achieved indicators of science process skills by involving the ability to think creatively. The interaction that occurs between the PjBL model and creative thinking towards SPS is due to the application of the PjBL model which is applied to worksheets to train creative thinking skills and SPS in every syntax of the PjBL model.

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The authors i.e T.H, M.R, R.A, S.H and M.H.E are jointly cooperative to complete this article at each stage.

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The authors declare no conflict of interest.

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