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The 2P3A Learning Model in Developing Argumentation Ability, Literacy Skills and Problem Solving Skills

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Abstract. Education is requires students to have skills to support the learning process in the 21st century. 21st century learning skills can be trained in various ways including through the learning model used by the teacher. The 2P3A learning model consists of 5 main stages, namely the Preparation stage, the Problem Statement stage, the Analyze stage, the Argument stage and the Application stage. This learning model focuses on training and improving argumentation skills, problem solving skills and literacy skills of students. Argumentation skills are enhanced at the Argument stage where students will be trained to state their views about a problem, Problem solving skills are improved through the Analyze stage where students are trained to look for and analyze problems given and Literacy Skills can be trained through the Preparation stage where students will be accustomed to read the learning material before starting the learning process.

Keywords: Learning Model; Argumentation Ability; Literacy Skills; Problem Solving Skills

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INTRODUCTION

The shift toward 21st-century learning reflects a global recognition that traditional education models are insufficient for preparing students to navigate an increasingly complex, interconnected, and rapidly evolving world. The core principles as inquiry-based learning, personalization, relevance, and higher-order thinking skills was central to this transformation. In 21st century learning every student learns in their own way so teachers are challenged to find ways to help all students learn effectively, this is due to the demands of 21st century education which requires students to be ready to face the challenges that exist (Panadero *et al*, 2020., Zhang *et al*, 2025).

The developments in the 21st century demand that students prepare various intellectual skills. This century was known as the era of the knowledge-based economy, which requires a new pedagogical paradigm (Luckin *et al*, 2023) Education in the 21st century requires students to master various skills that can be used in empowering their abilities. Skills in the 21st century include (1) Life and career skills, (2) Learning and Inovation skill dan (3) Information media and technology skill (Trilling *et al*, 2022)

Among the skills in the 21st century that need more attention are problem-solving skills. Problem solving is the participation of students in a task whose solution method is known by the students themselves based on previously learned theories. In order to find a solution to a problem, students must have the initial knowledge they have gained during the learning process in the classroom. Problem-solving skills have characteristics of other skills such as identifying and skills to search, select, evaluate, organize, and consider various alternatives and interpret information (Zubaidah, 2017).

Problem solving skills are the foundation in dealing with various problems encountered in life. Problem solving can help students use their logical thinking in analyzing problems and contribute to providing alternative

solutions to problems that arise in the community (Saptono, 2021). Unfortunately in fact, most of the learning has not implemented a learning model that can improve problem solving skills so that in several studies revealed that students problem solving skills are still very low, including research conducted by (Choeriyah, 2021) which explained that students' problem solving skills were still in the very low category which was reinforced by research conducted by (Kour & Rafaqi, 2024) which states that there are several factors that cause students problem solving skills to be low, including the use of inappropriate learning models, learning models that are not applicable and the lack of mastery of pedagogical skills by teachers.

In the 21st century, social scientific problems continue to emerge in the community, including in the scope of learning. The problems that have emerged lately have been utilized by irresponsible people to spread false news. An effort to counteract the spread of false information is to have the ability to argue. Learning that takes place should connect science concepts to social problems. According to (Cho & Jonassen, 2002), Argumentation skills involve informal reasoning and involve problem solving, making statements, making decisions supported by data and evidence and forming ideas.

Based on several studies that have been conducted previously, students argumentation skills in biology learning are classified in the poor category with only 44% of students using backing (support or sources) and 0% rebuttal (refutation) (Faiqoh dkk., 2018). Other research conducted also indicates the low argumentation skills of students with a percentage of each element, namely 92% of students use claims when arguing, 81% of students include warrant (justification or reason), 92% of students use data (evidence) correctly, 74% of students use backing (support or source), 38% of students use qualifications and 93% rebuttal (refutation) (Wahyunan dkk., 2021).

The skills that students should have are literally skills, science literacy means “literate”, while science means natural knowledge. PISA defines science literacy as the ability to use scientific knowledge, identify questions and describe conclusions based on evidence to understand and make decisions about the natural world and its changes due to human activities (OECD, 2004). In measuring a country's science literacy skills, PISA (Program for International Student Assessment) is held. Indonesia is one of the countries that consistently participates in the PISA assessment. However, the results obtained are still far from satisfactory. Indonesia's achievements are always below the international standards that have been set, and even tend to decline. Therefore, various efforts are needed to improve literacy skills for students.

Based on some of the problems described beforehand, an innovative learning model was developed which is expected to be able to provide solutions to these problems, the learning model was chosen because the syntax in the learning model can direct students towards the goals to be achieved in the learning process both from the aspects of knowledge, skills and attitudes (Wahyuni, 2021). The learning model that is considered as a solution in handling this problem is a 2P3A learning model (Preparation, Problem Statement, Analyze, Argument, Aplicate).

This 2P3A learning model could improve students literacy skills through the preparation stage where students will be invited to read before starting the learning process so that later students have an overview of the concepts to be taught. This 2P3A model can also improve students' problem solving skills which are reflected in the Analyze stage where students are trained to solve problems related to concepts to be analyzed and associated with daily life problems to get solutions to these problems. In addition, this 2P3A Learning Model as well as can train students' argument skills through the Argument stage where students will be trained to speak to express their opinions and views on the solution to the problems raised in the learning process.

MATERIALS AND METHODS

This research uses the Literacy method to review various literatures related to the development of 21st century skills and the learning model underlying the 2P3A (Preparation, Problem Statement, Analyze, Argument, Aplicate) learning model. The data were collected and then associated with the elements that make up the 2P3A learning model and then presented in the form of a discussion so that conclusions can be describe. The following are some of the skills developed along with the underlying learning model: Problem-based learning to improve problem solving skills, Problem-based learning is learning based on problems. Problems are used as a starting point to improve students problem solving skills and integrate knowledge. In the problem-based learning model, students are asked to find problems, connect with other fields of science, and provide solutions to the problems presented.

Some research indicates the potential of problem-based learning, including research conducted by (Utami dkk., 2023) concluded that the application of problem-based learning model could improve students ability to solve biological problems. There are differences in problem solving skills and motivation between groups of

students who learn through problem-based learning models and groups of students who learn through direct learning. Research results (Sahyar & Fitri, 2017) stated that the problem solving ability of students who were taught using a problem-based learning model was better than conventional learning. In line with the research results (Rokhmawati dkk., 2016) concluded that the application of problem-based learning models in the learning process can improve students problem solving skills. In addition, research conducted by (Argaw dkk., 2016) It also concluded that the problem-solving skills of the experimental and comparison groups taught using the problem-based learning model improved significantly but motivation in both groups was still low.

Problem-based learning can increase argumentation skills. Argumentation skills are defined as reasons to strengthen or reject an opinion, stance, or idea. Argumentation is an important component in critical thinking, because every individual in daily and professional activities needs argumentation (Fatmawati dkk., 2018). Argumentation provides a means for students to discover, verify, and evaluate principles or concepts. When students are faced with various conflicting concepts, students who are able to argue well, will be able to provide claims that are correct and supported by justifications that are in accordance with the correct concept (Wardani dkk., 2018). Students science argumentation skills could be hindered due to teacher-centered classroom processing, where the teacher initiates a question and then students respond within seconds with a single word or phrase. Such a power relationship does not encourage classroom discourse and dialogic interaction. In research conducted by (Agusni dkk., 2019) stated that students argumentation skills in the learning process are honed through a problem-based learning model. Problem-based learning supports students to argue. It confronts learners with a given problem using science concepts that have been learned. Learners are stimulated to form their arguments through problems given during the learning process. A learning environment that supports students to argue can improve students' ability to express their opinions and communicate their thoughts to form a structured line of reasoning.

RESULTS AND DISCUSSION

Based Development

The 2P3A learning model based on the theory of constructivism is constructive. Constructivism is a theory that is able to build abilities and understanding in the learning process. Therefore, by having a constructive nature, it is expected to increase the activeness of students (Suparlan, 2019). Constructivism theory is an active activity, where learners build their own knowledge, find the meaning of what they learn and is a process of solving new concepts and ideas with the framework they already own (Saputra, 2024). Based on the above opinion, it can be understood that constructivism is how to activate students by providing the widest possible space to understand what they have learned by applying the concepts they know and then practicing them in their daily lives.

In the perspective of constructivism, (1) Learning refers to the idea that the acquisition of knowledge presents a re-construction of different structures in an external view, (2) Constructivism theory emphasizes the coordination of previous actions, not directly from environmental information, therefore knowledge is not a reflection of the outside world but is obtained through experience. experience, (3) Constructivism Theory makes learning more meaningful, meaningful learning means instructing information in other research structures and (4) Constructivism Theory has freedom in learning where students are free to associate the knowledge they get both in their environment and in the school environment so as to create the expected concept (Mariska, 2024).

Another theory that supports the 2P3A learning model is humanistic learning theory, this theory was developed by Abraham Maslow who believes that learning activities should require students to think inductively, prioritize practice and emphasize the importance of student participation in the learning process (Suprihatin, 2017). Humanistics considers that it is the learner who acts as an independent subject to set his own life goals, learners will be required to have the nature of responsibility for their lives and the people around them (Iskandar, 2016).

Learning based on humanistic theory emphasizes efforts to build communication and relationships between individuals and individuals and groups. Learning is not only about transferring knowledge, forging language skills of students but also as self-actualization of students relevant to educational goals. According to humanistic theory, successful learning is basically the ability to bring meaning between educators and learners so that they can achieve the goal of becoming superior and wise human beings. The point is to demand learners that they need character education. In humanistic learning, educators will facilitate learners to explore, develop and apply the skills they have so that learners are able to maximize their potential (Zulfikar dkk., 2017).

The next theory that is considered in accordance with the 2P3A learning model is the social learning theory proposed by Albert Bandura. (Suwartini, 2016) explains that social learning theory or commonly called social-cognitive initiated by Bandura is part of the Classical Conditioning behaviorism personality theory. This

Classical Conditioning learning theory was first introduced by Ivan Pavlov. Classical Conditioning is a learning model that uses a stimulus to generate stimuli naturally through another stimulus.

Cognitive social learning theory explains that people can learn by simply observing the behavior of others. Bandura believes that learning through observation is much more efficient than learning through direct experience, through observation people can get a lot of responses, which are followed by relationships or reinforcement. This symbolic cognitive skill allows people to transform what they learn in various situations into new patterns of behavior. In learning activities, children have ample opportunities to develop their potential through social interaction, so cooperative, collaborative and contextual forms of learning are very appropriate (Ekawati, 2019).

2P3A Learning Model Syntax

Table 1. 2P3A Learning Model Syntax

Steps	Learning Activities
Steps 1 Preparation	Learners read materials related to the topic given in the previous meeting (Performed before the learning process begins)
	The teacher asks questions to learners randomly to test mastery of concepts
Steps 2 *Problem Statement*	The teacher raises a problem that is related to the concept that has been understood by the learners previously
Steps 3 *Analyze*	In groups, learners work together to solve problems through logical reasoning under the guidance of the teacher
Steps 4 *Argument*	Learners convey the results of their group discussions in class discussions both orally and in writing
	Other participants in different groups will assess, criticize and evaluate the information presented using the information they know through literacy activities before the learning begins
	The teacher will add and reinforce the material
Steps 5 *Aplication*	Learners are given the task to relate the concept to daily life (in the form of project assignments)

The syntax of the 2P3A learning model is expected to improve students' argumentation skills, problem solving skills and literacy skills. In the first stage, namely preparation, students read material related to the topic given at the previous meeting (Conducted before the learning process begins) this stage is intended to make students have the habit of reading before starting learning, Literacy skills are needed in the development of 21st century education. According to previous research, literacy is considered the main capital for students and the younger generation in learning and facing future challenges. Literacy is the main spear for facilitating the mastery of material and empowering knowledge (Odah, 2023).

Third stage, the Analyze stage, the skills that are expected to develop are problem solving skills. Problem solving skills are closely related to critical thinking skills where the two go hand in hand. Problem solving skills are when a person is faced with a phenomenon or problem that contradicts expectations and reality but he can solve the problem or can answer the phenomenon by applying the knowledge or theory he has previously obtained. Problem-solving skills help learners to construct new knowledge and facilitate science learning (Supiandi & Julung, 2016). At this stage, students work together to solve problems through logical reasoning under the guidance of the teacher so that it is hoped that students' problem solving skills can develop well.

The fourth stage, namely the Argument stage, at this stage students convey the results of their group discussions in class discussions both orally and in writing then other participants in different groups will assess, criticize and evaluate the information presented using the information they know through literacy activities before learning begins. Argumentation is one of the processes to gain a deeper understanding of complex issues by connecting evidence and stance. Based on the above statement, of course, argumentation skills are needed in 21st century learning, because the stages in this learning are expected to foster and develop students argumentation skills.

Social System

The social system of the learning model is the interaction that occurs between learning actors, this relates to the interaction that occurs between teachers and students to achieve the expected targets. In the 2P3A learning model, the interaction that occurs in the learning process is student-centered interaction. In this 2P3A learning

model, the learning process is dominated by students, especially in terms of problem solving and the teacher is only a facilitator who supports the learning process to run well.

Reaction Principles

The reaction principle in the learning model is an activity that describes a reasonable teacher response to students both individually and in groups. This reaction principle relates to the techniques expected by the teacher in reacting to student behavior during learning activities. The reaction principle for the 2P3A learning model is described in the following Table 2.

Table 2. Reaction Principles 2P3A Learning Model

Steps	Reaction Principles
Preparation	Provide motivation and encouragement for learners to continue to improve their literacy skills
	Facilitate all learners in accessing as many sources of learning as possible in accordance with the material to be taught.
	Testing students understanding through asking several questions related to the concepts to be learned
Problem Statement	Mengorganisasikan peserta didik kedalam beberapa kelompok
	Presents the various problems to be solved
Analyze	Encourage and respect students uniqueness by accommodating students thinking, developmental level, and self-perception.
	Encourage learners to be active in analyzing the problems presented.
	Guide students in finding several references that can be used as references in solving the problems presented.
Argument	Creating a conducive and pleasant classroom condition so that the process of expressing opinions runs optimally
	Give learners the freedom to express their arguments about the solution to the problem presented.
	Accompanying and evaluating each argument presented by each group.
Aplication	Guiding students to interpret the learning process so that the material can be actualized in everyday life.

Instructional Impacts

The instructional impact of the learning model is the learning outcomes achieved by students directly, while the instructional impact of the 2P3A learning model includes:

1. Learners ability to improve their literacy skills
2. Learners ability able to develop high-level thinking skills in the form of analysis and evaluation activities carried out in problem solving activities
3. Learners ability able to develop a broad understanding of concepts
4. Learners able to improve their argumentation skills through discussions and presentations in class.

Complementary Impacts

The accompanying impact is another learning outcome produced by a learning process, as a result of the creation of a learning atmosphere experienced directly by students without direct direction by the teacher, The accompanying impacts of the 2P3A learning model include:

1. Cultivate learners literacy habits
2. Increase learners confidence and can foster a sense of tolerance in opinion
3. Improve cooperation between students in solving the problems they face
4. Improve the ability of students to apply learning materials in everyday life
5. Improve literacy, argumentation, analysis, evaluation and creation skills that can support higher-order thinking skills

Implication of 2P3A Learning Model in Biology Learning

This 2P3A learning model focuses on developing problem solving skills, argumentation skills and literacy skills. In learning biology, there are several characteristics of suitable material, including biological material that is able to bring up various phenomena related to daily life so that the material can be analyzed by students. After analyzing students will be required to convey their various views on the solution to the phenomenon, the delivery of this argument is certainly based on existing facts and theories, these insights are certainly obtained

through various studies (literacy). Some suitable materials include human organ systems, viruses, bacteria, ecosystems, environmental damage and other materials that are closely related to daily life.

CONCLUSION

There are several skills that must be possessed by students in facing 21st century learning, therefore an innovative learning model was developed that is able to develop these skills. This learning model is called 2P3A (Preparation, Problem Statement, Analyze, Argument, Aplicate). This learning model is expected to improve argumentation skills, problem solving skills and literacy skills.

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