

THE DEVELOPMENT OF LEARNING MODEL OF PROBLEM CONFIRMATION WITH ELABORATIVE AND COLLABORATIVE SHARING (PCECS) ASSOCIATED WITH MIND MAPPING APPROACH

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ARTICLE INFO ABSTRACT

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| Received: February, 26th 2022 | <i>The objective of this research was to develop a learning model of problem confirmation with elaborative and collaborative sharing associated with mind mapping approach [PCECS] to foster the students' critical thinking skills in science learning at secondary high school. This research used the research and development approach by using validation instrument of need assessment via google form. 10 teachers of 9 schools in Jember Regency were taken as the respondents. The validation results referred to what the teachers' idea, in which critical thinking skills and prior knowledge were 55,6% intertwined. On the other hand, 90% of teachers agreed upon the underdeveloped students' critical thinking skills. It was found in the validation results that there need a development on learning model to maximize the prior knowledge as one of the factors to foster critical thinking skills and learning achievement.</i> |
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KEYWORDS Critical thinking skill, Prior knowledge, Mind Mapping



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INTRODUCTION

Science aims at conceiving the natural phenomenon in a pile of systematic theories and generally, its implementation limits over one phenomenon developed through a scientific method like observation and experiment (Wang & Song, 2021).

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Science learning at secondary school requires the students to find out about nature and how it relates to the existing facts. Science learning bones to oneself and surrounding nature as well as its implementation in wrapping up the problems faced in daily lives. The process of science learning changes according to the paradigms of society.

The paradigm of 21st century quite swiftly changes/develops. There are tons of learning innovations taught by teachers and educators to develop the 21st learning process. This learning was suited to the needs of human resources to the problems found in society. Thus, various competencies needed by the students to face the globalization era was known as 21st Century Skills and its educational concept was 21st Century Learning. The skills involved critical thinking, problem solving, creativity, innovation, communication, and collaboration (Chai & Kong, 2017).

The 21st Century Skills applied in Indonesia Educational System have been reflected in the Revised 2013 Curriculum. The skills applied in science learning are complex in which all materials/subjects are based on the scientific thinking that encourage students to think critically and be creative to create a product.

Creative thinking skill is defined as the skill to make the right decision upon the facts through analysis, evaluation, and synthesis. It helps the students solve the problems independently on their thoughts. Constructivism learning theory is used to hone the critical thinking skills as the individual's cognitive level affects the process of problem solving implying that one's experience level influences the learning process at school (El Soufi & See, 2019).

Student-centered learning has already been conducted at schools implementing 2013 curriculum or the revised one. However, some are still into teacher-centered to adapt to their condition; there is no maximum effort to undergo both concepts as the students find it difficult to grasp the basic concepts and are likely to be lack of reasoning ability on science, and the skills to communicate and collaborate among students are low especially on teacher-centered learning (Yulizawati, Lisa, & Oktofa, 2021).

The 21st Century 10 skills should be possessed by the students according to the identifications done by US-based Apollo Education Group; among those 10, the foremost-possessed skill is critical thinking skill since it is able to increase one's understanding to analyze and evaluate information in solving problems (Mutakinati, Anwari, & Kumano, 2018). One of many factors developed to increase the critical thinking skill is through the students' prior knowledge. This prior experience or knowledge of individuals shapes them to achieve new knowledge or solve the similar or newly-encountered problems (Zambrano, Kirschner, Sweller, & Kirschner, 2019).

Prior knowledge is one of the students' characteristics form. Background and experiences variety causes different prior knowledge (Glogger-Frey, Deutscher, & Renkl, 2018). Those with high prior knowledge can learn better than their average and low-ability peers. Prior knowledge obtained by the students before learning affects the learning process significantly. If the prior knowledge is good, the teacher and students will be easier to interact with each other positively, which will ease the learning. Prior knowledge in the learning process can ease the students to understand the concept. If the students can understand the concept better, it will trigger their activeness and critical thinking ability (Yatmi, Wahyudi, & Ayub, 2019).

Someone's prior knowledge is influenced by the environmental condition, starting from school and society. One of the school environment factors that influence prior knowledge is the quality of the school environment itself, such as located far from the city center, especially in remote areas such as mountains, plantations, and coastal areas. It tends to have quality and facilities that are different from schools around the city center. School conditions close to learning information sources such as plantations and local

potentials in the area can be one of the triggering factors for developing individual prior knowledge (Dong, Jong, & King, 2020). Besides, society's environment can be another factor that influences someone's prior knowledge. The environment where an individual grows up is the environment that provides initial information to the individual to develop and adapt himself in that environment. Prior knowledge of the environment becomes a trigger that teachers can use as a catalyst in the learning process, especially in the science learning model (Dong et al., 2020).

A learning model that can be one of the innovations used to improve problem-solving, communication, collaboration, self-evaluation, and critical thinking abilities with high creativity is Problem-based learning. In Problem-based learning, the problem is raised from the real world and used to motivate students to learn. There is an information exchange process among students during the problem-solving process to get a solution and finally answer the problem. The teacher plays the role of a facilitator. The weakness of this learning model is that when the students do not understand the material, it will be difficult for them to solve problems about the topic being taught so that they will have difficulty in understanding the concepts during the learning process, which ultimately does not work as expected (Anazifa & Djukri, 2017).

One way to overcome the aforementioned weakness is to use a method that can develop students' abilities in understanding the concept formation process in learning by using the Mind Mapping learning method, which is one of the learning methods that can develop students' creativity, activeness, memorization, knowledge, and independence in achieving learning objectives (Sulastri, 2019). Based on this background, developing learning based on students' prior knowledge is still lacking, mainly due to the lack of learning innovation that can give students more freedom to express their prior knowledge based on problems in their daily lives.

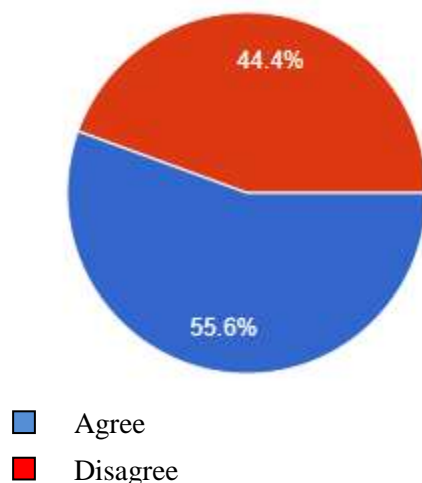
RESEARCH METHOD

The approach used here was research and development (RnD) containing a series of processes to develop a new product or improve an existing product that can be accounted for (Sugiyono, 2019). The product developed in this research was a Problem Confirmation learning model with Mind Mapping-Based Elaborative and Collaborative Sharing to develop prior knowledge that improves critical thinking in Science learning at junior high school. The needs assessment data collection was conducted in the odd semester of 2020/2021 by using a questionnaire distributed through Google Form for junior high school biology teachers. The needs assessment data were used to know the issues and needs in the school. The result of the needs assessment was used to develop the learning model referred to in Science learning at junior high school.

RESULT AND DISCUSSION

Based on the results of test validation of needs assessment that has been distributed to 10 teachers from 9 schools in Jember, it can be seen that the curriculum used in schools at the moment is Curriculum 13. The learning model used by the majority of teachers was lecturing method. Some of them used the constructivist, discovery, PBL and STAD cooperative models. From the results of the need assessment also found that 44.4% of teachers disagreed about the need for prior knowledge in the learning process.

While 55.6% of teachers agreed about the importance of the influence of prior knowledge on critical thinking skills. The results of the distributed assessment showed that most of the teachers did not pay attention to the importance of prior knowledge where some answered that prior knowledge can help students understand the subject matter.



From the results of the overall need assessment, it was found that 9 out of 10 teachers agreed on the need to develop learning models that could increase the use of students' prior knowledge. Most teachers thought that prior knowledge can improve students' critical thinking skills and some thought that the techniques and creativity of teachers in teaching are the most influential.

The PCECS learning model has its own characteristics that distinguish it from other learning models (Rumiyati, Indrawati, Sutarto, & Wicaksono, 2017). The PCECS learning model has characteristics in the maximum use of students' prior knowledge in the learning process. Prior knowledge can be an asset for an individual to achieve new knowledge or solve problems they encounter and problems related to their experiences (Nur, 2000). Individuals who have good prior knowledge will get good experience in the future. It is because prior knowledge can play an important role in the thinking process of an individual. The more experience have by an individual, the easier for the individual to solve problems based on the experience they have (Pamungkas, Setiani, & Pujiastuti, 2017).

Students' prior knowledge can be a catalyst that helps students in critical thinking process. The ability to think critically is the ability to consider the right decisions based on facts through analysis and evaluation. Although it can be a strong catalyst, prior knowledge-centered learning must be planned carefully because this learning will be time consuming compared to conventional learning (Mutakinati et al., 2018). With the development of a model that focuses more on prior knowledge as a basis in the learning process, later on, students' creative and cognitive thinking can be more honed and can become a meaningful learning.

CONCLUSION

Nowadays, the model used by teachers has developed quite a lot. It can be seen from various different learning models ranging from STAD, PBL, constructivist, and

even discoveries. From all these models, the results of the assessment also showed that the teachers did not maximize the potential of the maximum use of prior knowledge in the learning process. Prior knowledge can actually be a strong catalyst for students because it is the basis of a mind concept that students have so that they can process information and the results can spur them to think more critically which makes learning meaningful. The learning process that focuses on the use of students' prior knowledge can take more time than the usual learning process due to the possibility of students being less motivated in learning, and to overcome this depends on the creativity of a teacher in learning.

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