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Development of Ecological Intelligence of Elementary School Students using Problem Based Instruction

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Abstract. Life on earth is very diverse as humans, animals, plants components that exist in both land, water and air. Everything on this earth is interconnected. Humans will not be able to live without water. Likewise, if there is no land to function as a place to gather water, water will not be created on this earth. Life on earth should be safe and prosperous so that the creation of ecologically intelligent human life, attention to the place where people live socially and preserve nature. But in reality there are still humans who do not have ecological intelligence such as not yet preserving nature so that in the river there is still a lot of plastic garbage piled up, water, polluted air are all caused by human behavior itself. Elementary school students as a foundation to save the earth from various threats, therefore primary school learning must be effective which results in the creation of students who have ecological intelligence. but in reality there are still students who make rubbish randomly, use excessive plastic, preferring to buy bottled drinks rather than carrying them from home. With this problem learning must be able to have an efficient strategy. Problem Based Instruction learning related to the environment is considered to be able to change people who have ecological intelligence so that they are aware of the threat of the earth.

Keywords: Model Problem based instruction, Ecological Intelligence

INTRODUCTION ~ The earth was created to function as a place where all life activities, whether human, animal and plant life. Various components of the earth contained therein such as earth, water, fire and air are the means for the continuation of life created by the creator of Allah SWT. Humans are the most noble creatures who live on earth interacting between humans with one another, humans with groups, groups with the group itself.

Humans must also be able to interact with the surrounding environment in the form of components that exist on earth. In order to be able to live a safe, peaceful and peaceful life, human beings themselves are aware of the care and preservation of those who do not have an impact on themselves but rather have an impact on the natural environment. In fact, according to observations on human social life itself that damage their survival such as using excessive plastic waste, littering, buying products that do not think about their needs and desires, do not save water, use foreign products rather than foreign products consume unhealthy food , does not keep the environment clean, has less toilet cleanliness.

Plastic waste is very taboo in the conversation of ecoliteration Disposing of any plastic waste will have a negative impact on the surrounding environment, such as the clogging of water flow will cause flooding so that human activity which is a social creature becomes disrupted. school. Whereas elementary school students are the initial foundation for the creation of quality human beings in order to achieve good state goals. Therefore plastic waste can be considered fatal if not treated.

Burning waste freely will cause the ozone layer to thin out so that living things that live on earth are threatened with life, such as cancer of the skin, cataracts and can even damage plants and life in the sea. Plants that are served during the day serves to release oxygen that is needed by humans, if there is no oxygen, humans will not live.

Plastic waste is not the only problem in ecoliteration that excessive exploitation also causes flooding. Therefore, the need for human beings to have good relations with each other and invite to do good, honesty, mutually advise respect, respect that is included in ecological intelligence.

Quality education can change into an intelligent human being and can preserve, maintain the environment around both the natural environment and social environment. Learning in elementary school is an effort to change people. The interaction between teacher and student is one of the learning activities. Teachers who are considered experts in their fields to be able to change all human actions into as expected, making people who do not know become known. Then the teacher must have an effective strategy. In this case the learning model of *problem based Instruction is* used for teaching and learning activities.

The *problem based instruction* model has advantages over other learning models. the advantages of the model are that the *problem based learning problem is* presented more to problems that are related to the environment and conducting experiments to make higher-order thinking namely critical thinking in solving the problem.

According to John Dewey in Sudjana, (2001) the model *Problem Based Instruction* is "the interaction between stimulus and response, a relationship between two directions of learning and the environment".

The Model is *Problem Based Instruction Based* on the theory of educational psychology, namely the constructivism theory developed by Piaget, Vygotsky, Bruner's theory and others. Students learn independently by gathering various sources of information to solve problems and make discoveries that are guided by the teacher so that the teacher acts as a guide and facilitator (Trianto, 2010: 28).

Experiences related to the daily lives of students become a source of learning for students themselves as they experience the student environment itself. Learning Social Sciences in the material of human interaction with the natural environment, socio-culture, economics in the hands of creative teachers learning will be very meaningful that relates to everyday life by requiring students to think critically and have ecological intelligence to save the earth from threats.

Students who have ecological intelligence can be claimed that these students can save the earth from various threats that can damage the natural environment.

Ecological intelligence also includes social skills that interact directly with nature in which humans live, not just interacting with their people.

In fact according to observations on the problems that have been presented by students themselves that must be changed and made as humans who have high ecological intelligence. Elementary school education is the initial foundation for building human ecological intelligence. So the need for this research article in the form of literature review in order to provide information related to strategies for developing ecological intelligence of elementary school students

METODE

The method in this research uses literature study *(literature review*). According to Creswell (2015: 170) the study of literature is a written summary of various sources of information in the form of journals, books, articles and other documents that describe previous and current information on research topics.

According to Sugiyono (2016) Literature study is a theoretical study and references as well as other scientific literature relating to norms, values and culture with developments in social conditions on the topic of researchers.

Literature study of Ratna in Prastowo (2012: 80) is all elements or reading material that may have been read and analyzed and collected which are already published or as a private collection.

Arikunto (2006) revealed a literature study of data collection methods conducted by searching information through books, magazines, newspapers and other literature with the aim of forming a theoretical foundation.

Meanwhile according to Sukardi (2004: 38) Literature study is a theoretical study that examines by focusing contextual information to solve research problems.

Based on the opinion of several experts, it can be concluded that literature study is an activity with the technique of observing, reading, collecting and analyzing data from various sources such as books, journals, reports, historical records, documents and so on related to phenomenology.

Cooper in Creswell (2015) suggested that the purpose of literature study is to provide information to readers of the results of other studies relating to the research to be conducted, linking the existing literature, and provide solutions from previous research.

Stages in Reader Review *(Literature*Review)

Do some research using literature study must come through the proper stages aims to get results effectively and efficiently. These stages can guide the initial steps that will be addressed to the final step. According to Creswell (2015: 174) the

stages of conducting a literature review are as follows:

1. Identifying key terms aimed at finding the literature *(Identify key terms)*.
2. Determine the place of literature (*Locate literature) in* accordance with the topics that have been found from the database or the internet.
3. *Critically evaluate and select the literature*.
4. Arrange selected literature (organize the literature).
5. Writing (*a literature reviewWrite a literature review*).

RESULTS AND DISCUSSION

According to Arends in Trianto (2010: 92) *Problem Based Instruction* is the process of student learning strategies to do problems by assessing the problem solving process aims to collect various information, train the ability to find and think higher-level independently.

According to Rusman (2014: 237), *Problem based Instruction* is a learning model to develop students' understanding of problems by knowing and understanding the imbalance, knowledge and having a paradigm to solve the problem.

According to Purwaningsih (2013: 5) *Problem Based Instructio*n was developed to help students develop thinking skills, problem solving and intellectual skills, learn various roles, through experiential learning in real life.

Arguments that have been revealed by experts, it can be concluded *Problem Based Instruction* is a learning model that requires students to think at a high level, namely critical and creative thinking with contextual problems assessing each process so that they can solve problems independently

Problem Based Instruction is also related to problem based learning models such as, project based learning (*project-based instruction*), experiential learning (*experience-based instruction*), authentic learning (*authentic learning*), meaningful learning (*anchored instruction*) (Ibrahim in Trianto 2010: 92-93).

The theory of constructivism is the basis of the model *problem based instruction*. In addition, there are several theories that underlie the *problem based instruction,* namely; David Ausubel's Theory, Vygotsky's Learning Theory, Jerome'S.Bruner's Learning Theory.

David Ausubel's theory is a meaningful learning theory, Ausubel in Rusman (2014: 244) meaningful learning is learning that links new information with the preparation of cognitive concepts that have previously been understood.

Vygotsky's theory is a learning theory that is almost the same as constructivism learning theory, only it has a difference Vygotsky relates the new information experience with the initial information that has been obtained so as to obtain complete knowledge. Communicating with friends

will respond to the occurrence of new ideas and concepts so that it can expand the intellectual development of students (Rusman, 2014: 244).

Jerome S. Bruner's theory is a theory of discovery learning. Bruner in Rusman (2014: 244) revealed that students learn by searching and finding their own knowledge so that they can solve problems and then find efficient results. But learning this discovery is not all students discover new knowledge not based on preliminary knowledge.

Scaffolding and social interaction are also used by Bruner. Social interaction students communicate with friends both the external and internal environment to find information and solve problems. While *scaffolding* according to Rusman (2014: 255) is a learning process by guiding students to solve problems that exceed the ability of student development by the teacher or someone who understands better, has more ability.

According to Koçak, Buzan and Iúık (2009, p. 2364) the teaching and learning process carried out by students by working in groups will issue good applications in learning such as; 1) getting used to acknowledging *statements* other people's2) being able to reveal new designs, 3) not making individualism, 4) strengthening *relationships* 5) preventing phobias of guilt, 6) complementing each other.

According to Arends in Trianto (2010: 93) *Problem Based Instruction* has the following characteristics:

1. Submitting Questions or Problems (understanding the problem). Instead of organizing around certain academic principles or skills, problem-based learning organizes teaching around questions and problems that are both socially important and meaningful to students.
2. Focusing on interdisciplinary linkages. Although problem-based learning may be centered on certain subjects (science, mathematics, and social sciences), the problem to be investigated has been chosen to be really real so that in its solution, students review the problem from many subjects.
3. Authentic Investigations. Based learning requires students to conduct authentic investigations to find real solutions to real problems. They must analyze and define problems, develop hypotheses, conduct experiments (if needed), make inferences and form conclusions.
4. Produce products and flaunt them. Problem-based learning requires students to produce certain products in the form of real work or artifacts and demonstrations that explain or represent the form of problem solving they find. The product can be in the form of a debate transcript. The product can also be in the form of

reports, physical models, videos or computer programs.

5. Collaboration / collaboration. Problem-based learning is characterized by students who collaborate with each other, most often in pairs or in small groups. Working together provides motivation to sustainably engage in complex tasks and expand opportunities for inquiry and dialogue and to develop social skills and thinking skills,

According to Ibrahim in Trianto (2010: 97) there are five stages/syntax of learning *Problem Based Instruction*, can be seen in table 1 below:

Table 1. five stages/syntax of learning *Problem Based Instruction*

Phase	Teacher Behavior
Stage -1 Student orientation to the problem	The teacher explains the learning objectives, explains the logistics needed, proposes phenomena or demonstrations or stories to bring up the problem, motivates students to be involved in solving.
Stage -2 Organizing students for learning	Teacher helps students to define and organize learning tasks related to the problem.
Stage -3 Guiding individual and group investigations	Teacher encourages students to gather appropriate information, implement experiments, to get explanations and problem solving.
Stage -4 Developing and presenting the work	The teacher helps students plan and prepare appropriate work such as reports, videos, and models and helps them to share assignments with their friends
Stage -5 Analyzing and evaluating the problem solving process	Teacher helps students to reflect or evaluate their investigation and the processes they use

Meanwhile, according to Rahman (2018: 21) the steps of *Problem based Introduction are* as follows:

1. The teacher states the competencies that students must achieve, explains the equipment needed, motivates students to be involved in learning activities.
2. The teacher helps students define and complete the learning task.
3. The teacher encourages students to gather appropriate information, experiments to get explanations and problem solving, data collection, hypotheses, problem solving.

4. The teacher helps students in making reports.

5. The teacher helps students to reflect or evaluate their investigation and the processes they use.

According Trianto (2009: 96) *Problem Based Instruction* has advantages and disadvantages. The advantages of this model are as follows: (1) Relating to real life students. (2) plans must be aligned with students' needs. (3) building the nature of student inquiry. (4) Detention of students must be strong. (5) Developing Abilities *Problem Solving* students'. While its weaknesses include: (1) Accommodation in the form of tools, problems and concepts that are still united. (2) Difficulties find related problems. (3) misunderstanding when conceptualizing, (4) a long period of time.

Ecological Intelligence

According to Supriatna (2017: 24) ecological intelligence is "a person who understands that each of his behavior and actions not only have an impact on him and others but also on the natural environment in which he lives"

Pamer & Neal's exhibition in Muhaimin (2015: 79) revealed that ecological intelligence refers to basic knowledge about students' attention and concern to solve environmental problems both the natural environment and the community environment so that they have a paradigm of right and wrong rules to the environment.

The development of ecological intelligence is a major challenge to the industrial revolution era 4.0. Education in the industrial revolution era 4.0 has competencies that must be possessed by generations, one of which is the ability to think at a higher level. In order to bring up HOTS using problem-based learning that emphasizes critical and creative thinking then makes innovations from various ideas (Piirto, 2011; Trilling, 2009).

A person's social life must have ecological intelligence in order to contribute to saving the earth. Someone who has ecological intelligence in himself knows where the needs and desires that have no impact on himself so that a sustainable life is created by the act of preserving nature. Elementary school education is the initial foundation for building ecological intelligence, so learning in schools must be able to relate to the surrounding environment both the natural environment and the community environment.

The activities of students who bring bottles of drink from home in order to meet their bodily fluid needs are activities of ecological intelligence. By bringing drink bottles from home students understand and realize that the drinking water they consume is far better and more hygienic than buying drinks i packed in plastic bottles sold by producers.

The activity that students have undertaken is a 3R concept as stated by Supriatna (2017: 54) "students in urban areas can practice friendly living with the environment through the concept of *reduce, reuse, recycle*". *Reduce* means to patent or reduce all activities that cause waste. *Reuse* reuse garbage that still works. *Recycle* means to recycle and recycle waste into useful new products. Drinking water at home with clean water sources is far more hygienic than those sold by producers, this illustrates the ecological intelligence that students have.

Ecological intelligence is not only related to the surrounding environment but many other intelligences contained therein such as intellectual intelligence, social intelligence, emotional intelligence and spiritual intelligence (Supriatna 2017: 24). Intellectual intelligence is the initial capital to achieve success in school. To measure the knowledge of students in schools there are still using tests that are more dominant in aspects of knowledge with student learning outcomes shown. This relates to opinions Lickona (2012) suggests that learning is not only emphasized on cognitive, but also based on taste and actions that have moral values.

Someone who has high intellectual intelligence may not be said to have ecological intelligence. Someone who does not have an understanding of the environment will be difficult or even unable to live in harmony with nature. So, ecological intelligence is based on intellectual intelligence about how to conserve water, the right way to use energy, knowledge of substances and preparations available in food and then aim to preserve and preserve the environment.

In addition to intellectual intelligence to build ecological intelligence, emotional intelligence also influences. According to Goleman in Supriatna (2017: 25) "The results of research on the ability of someone who has a high IQ is not always superior in the world of work compared to those who have a lower IQ". Emotional intelligence is meant here someone who has good emotions, who can control emotions well. Someone who has ecological intelligence with good emotional intelligence can read the signs of events that occur due to human actions themselves not because of natural factors alone. Emotional intelligence is related to the empathy possessed by humans themselves, by having great empathy, feelings of affection for nature arise and are motivated to take action to preserve and preserve nature.

Intellectual intelligence and emotional intelligence can influence the building of ecological intelligence. but it would be better if coupled with social intelligence. Social intelligence in this case is an activity carried out with the ability and understanding of good relations with other individuals, individuals with groups and groups with groups. If emotional and social intelligence understand and have empathy for fellow human beings, then

ecological intelligence also includes the ability to understand natural systems and natural inhabitants.

intelligence Ecologicalcontains several other intelligences such as spiritual intelligence, intellectual intelligence, emotional and social intelligence. This relates to the presentation of the British National Curriculum Council (NCC) in Muhaimin (2015: 82-83) describing ecological intelligence as follows:

1. Knowledge and understanding
   a. About the environment at various levels from local to global.
   b. About the environment from issues and influences from local to global level.
   c. The importance of planning, regulation, and aesthetics in environmental management.
2. Skills
   a. Communication skills related to the environment
   b. Problem solving skills related to the environment.
   c. Social skills related to the environment
3. Attitudes
   a. Appreciation and concern for the environment.
   b. Respect the opinions of others
   c. Tolerance and openness

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