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Representation Analysis Of Science Process Skills With A Neuropsycological View At Elementary School

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ABSTRACT
This study aims to analyze how the representation of science process skills in science learning devices with a neuropsychological point of view, using valid, practical devices, and also effective in training science process skills that will later produce an image or representation of science process skills. This study used three stages of the 4-D model, with stages of definition, design, and development. This research is only limited to development. Representation of learning devices in the trial in grade V of elementary school with a one-group pretest-posttest design. The results showed that this representation of science process skills is interesting and easy to understand. By showing data on the practicality of learning, data on the validity of devices, and also data on the effectiveness of devices in representing science process skills. Assisted by a very positive student response shows that the student's neuropsychology looks good. Overall representation of science process skills using these learning tools can help learners process thinking more logically, and balance behavior better.

Keywords: *representation, science process skills, neuropsychology*.

INTRODUCTION

The representation on the meaning of science in each individual's thinking is different, as stated by each individual has a meaning in each experience with a variety of different kinds of learning. It depends on the meaning of the mind of our thinking. Some give the understanding that science is learning about nature, some say that science is the science of the solar system, some even state that science is a natural event that we study. As revealed by Croteau & Hoynes, namely Representation is the result of the selection process, in the selection process there is a certain part of reality that is highlighted and there is also a part that is ignored (Anon n.d.-b). it turns out that we often express everything that is in our minds or in our minds and that includes representation. Representation connects between concepts in our minds using language that allows us to denote objects, people or events that are real (*real*), and the imagination world of objects, people, objects and events. The unreal (*fictional*) (Anon n.d.-a). At the elementary school level, Natural

Sciences or science is one of the subjects that occupies an important role in education, this is because science can be a provision for students in facing various challenges in the global era. One of the skills that can be developed to prepare 21st century teachers is science process skills (Lepiyanto 2017). Science must be taught with learning that allows learners to develop the abilities they have and can build their own concepts. The basis of such learning is the learning of constructivism (Process 2014). Learning based on the achievement of science is learning based on the nature of science learning which is not only centered on memorization of knowledge but is oriented towards scientific achievement and the process in achieving it (Pertiwi, Atanti, and Ismawati 2018), therefore we realize that from an early age we must teach basic science process skills and continue on integrated science process skills in our students so that our students have a good meaning of science at a higher level of education. Starting from the basic science process skills taught in learning at each level of education not only in basic education, it will continuously make the accumulation of science process skills even higher. In line with the opinion All abilities accumulated into science process skills must continue to be developed with the help of teachers at each level of education (Jufri, 2013) if it has been carried out in the habituation of students to get learning with basic science process skills, learning integrated science process skills will be easier to do. With the achievement of science process skills easily implemented, it will make our brains process knowledge more deeply. We will see this with a neuropsychological point of view. Where cognitive processing or knowledge of students is more developed by being able to think logically according to the skills of the scientific process taught.

LITERATURE REVIEW

Found the development of the notion of science or science from the time of contemporancy. Gradually it has changed by becoming more rational, separate from the word imaginary, and tribal-customary beliefs, and increasingly developing again into a science obtained through scientific inquiry and called scientific inquiry, and growing with the scientific method, this was revealed by prof. Nur (Nur, 2016;1). The phrase dimyati in ariyanti 2010 states that process skills are separated into two, namely basic science process skills(basic skills), which include: observation, classification measurement, prediction, communication and inference. For integrated science process skills, namely: identifying variables, description of variable relationships, tabulation of graphs, data acquisition and processes, analysis of investigations, experiments and hypotheses (Priyandani, Afrikani, and Kurniasih 2014). Science process skills are all scientific skills that are used to find concepts or principles from a theory to develop existing concepts or counter previous discoveries. With the skill of the process of science this makes intellectual skills a distingtive for all scientists. This scientific process skill is also used to explore any phenomenon that occurs. This can happen and can be experienced by scientists

When scientists want to solve or reveal the mysteries of nature (Priyandani et al. 2014). According to Mundilarto (2002) the process of science is derived from the steps that *scientists* do when conducting scientific research, these steps are called process skills. Science process skills can also be interpreted as the ability or ability to carry out an action in learning science so as to produce concepts, theories, principles, laws or facts or evidence.

Below is described the science process skills trained in this study (Nur, 2013).

a. Hypothesis Development
   A hypothesis is a conjecture about what effect a manipulation variable will exert on the response variables. Therefore in the formulation of the hypothesis there must be a manipulation variable and a response variables. Hypotheses are formulated in the form of statements.
b. Variable Control
   A variable is a quantity that can vary or change in a particular situation. Each experiment involves several variables or factors that can change. Intentionally changed variables are called manipulation variables. Factors that can change as a result of manipulated variables are called response variables. Variable controlling means keeping the whole condition the same except for manipulation variables. Control variables are variables that are kept from affecting the results of experiments.
c. Conducting experiments
   Conducting experiments is the skill to test ideas derived from facts, concepts, and principles of science so that information can be obtained that accepts or rejects those ideas.
d. Obtaining and presenting data
   The data obtained from the experiments are recorded, systematically arranged, and presented in the form of tables, graphs or figures according to the type of data.
e. Analyze data
   Analyzing data is explaining the meaning of the data collected from the results of the experiment. Some of the behaviors of learners are: 1) data preparation, 2) recognizing patterns or relationships from existing data, 3) formulating appropriate inferences using data, 4) correctly measuring them.
f. Making conclusions
   Making a conclusion means making a statement that exemplifies what has been learned from an experiment or observation. The conclusions of these experiments are generally related to provisional answers (hypotheses). After conducting the experiment, recording observations and analyzing the data, it can finally be determined whether the experiment showed a temporary answer (hypothesis) it was accepted or rejected.

Neuropsychology

According to Gagne, learning is the arrangement or management of events that exist outside the individual of the students and is prepared by design and used to facilitate the learning process (Wahab 2021). Substantial of educational learning in the standard conditions of the educational process in Indonesia is intended for several important things, namely developing thinking skills, developing brain function, and lifelong learning. (Wahab 2021). In neuropsychology understood by the term executive function which means the performance of the pre frontal cortex, this indicates a term that includes the domain of cognitive processes or knowledge that is closely related to working memory, inhibition control, and shifting or cognitive flexibility, which is of widespread concern in neuropsychological research (Siregar 2018)

METHOD

This research uses a quantitative approach with a control case study using the main data sources obtained from grade 5 with 40 students, SDN 1 Urang agung Sukodono , Many students with low achievements about science process skills (groups that have 16% lower ranks in their class) and high achievements about science process skills (groups that have 15% high rankings in their classes). Design Research adapts the design of one-group Pretest-Posttest Design (Fraenkle and Wallen, 2003 p.272).

RESULTS AND DISCUSSION

Science process skills test results

Science Process Skills Indicators	Trial I		Trial II	
	Pretest	Posttest	Pretest	Posttest
Hypothesizing	0.20	0.77	0.26	0.96
Identify variables	0.00	0.73	0.20	0.93
Fill out the observation table	0.20	0.88	0.60	0.96
Analyze data	0.10	0.85	0.16	0.96
Making conclusions	0.10	0.69	0.20	0.96

In line with the modelling theory presented by albert Bandura (Nur, 2013). The results of modeling or impersonation tend to be similar or even the same as the behavior of the twisted individual. At meeting 1 it is modeled by the teacher in using science process skills in investigation activities so that at the next meeting it can be

used properly. Learners are trained to carry out the scientific method in LKS 1 on the influence of many batteries on bright lamps containing electrical energy matter. Students are so enthusiastic about participating in learning, it can be seen in the photo documentation of meeting 1 introduction to Science process skills. Furthermore, learning is given by continuing in phase 1, phase 2, phase 3. Until getting the results of the representation of the science process skills of learners with improved results.

The description of the learning steps of the RPP scenario refers to the inquiry learning phase. In the learning activities carried out there are six phases. The first phase is to get attention and explain the inquiry process to students. In this phase, students are given motivation to attract attention and students can follow the learning with enthusiasm so that the learning obtained is meaningful and can improve student achievement . This is in line with the opinion of Bryan Robert (2010); Patrick et al. (2007), Glynn et al. (2007) who stated that if it provides motivation at the time of learning, the achievement of learners can increase. This is also in line with Nur's (2008) opinion that learners who are motivated to learn something will use higher cognitive processes in learning that material, so that the learner will absorb and listen to that material better. Lezak (1995) explains that human behavior in the neuropsychological approach is explained as a system, that is, there is a cognitive system, an emotional system and an executive system. Including cognitive systems is the processing of information that includes receptive functions, memory-learning-thinking functions, and expressive functions. The emotional system includes emotions and moods (moods), motivations and which are personality variables. The third system, namely the executive, includes how a person behaves, whether he is able to help himself, his behavior, and others. . More than two decades ago, the neuropsychological approach was instrumental in establishing the neurobiological foundations of the brain in children with neurodevelopmental disorders. The technicality of neuropsychology has an important novelty in the abnormality of the child's neurodevelopment, and in the variation of neuroanatomy that categorizes whether the child has a developmental disorder or not.

In the first phase, the teacher not only provides motivation but also provides an explanation of the inquiry process if previously the learning inquiry has not been applied (Arends, 2012; Dokme & Aydinli, 2009; Sudiarman, et al (2015). This is so that students can follow the learning well because the learning developed by this study uses an inquiry learning model. Based on the data on the implementation of the Trial RPP 1, the implementation of the first phase was assessed by 2 observers to have a fairly good category while the data on the implementation of the Trial RPP II, the implementation of the first phase was assessed by 2 observers as having a good category with an average value presented by a match percentage of 97.8%. Providing motivation at the beginning of learning can affect the learning atmosphere

in the classroom, this is related to the implementation of learning in terms of the aspect of the classroom atmosphere. The classroom atmosphere observed by 2 observers consists of the suitability of kbm with learning objectives, connecting the surroundings with the material in the learners. The class atmosphere observed by 2 observers had a good category with the average score presented by Trial I the percentage of matches was 82.5% and Trial II the percentage of matches was 92.5%. this can be seen from the responses about students' interest in the learning process in Table 4.23 (p. 103). Overall, as many as 100% of students feel happy with the science learning that has been followed by students.

The second phase of the teacher describes the steps of discovery and organizes learners learning. In phase 2, students form groups and obtain LKS to carry out investigation activities. The LKS provided by the teacher is equipped with a problem formulation that can help students in conducting experiments. The formulation of the problem is a form of scaffolding that the teacher gives to students to conduct experiments. Scaffolding can help learners in the process of investigation and problem solving so that they can reflect on learning (Quintana, et. el 2004; Hmelo, et. el 2007). The formulation of the problem given by the teacher can encourage learners to do the assessment to find the answer (Bao, et al., 2009; Mercer, et al., 2004; Mahtari 2015). According to the theory of cognitive learning, learning is seen as an attempt to understand something. Learning is more than remembering. For learners, in order to truly understand and be able to apply science, they must learn to solve problems, find something for themselves and always grapple with ideas (Nur, 2008 p.1). therefore , it provides learners with a representation of the skills of the science process with a logical provision of meaning and can be an axis for future learners with a level the higher one.

The third phase, which is to ask students to formulate hypotheses to explain problems or events. In this phase, learners are guided to formulate hypotheses (temporary answers) from the formulation of the problems that have been provided. Learners are not only guided to formulate hypotheses but also guided to identify variables. In this phase, the role of the teacher as a mediator is to provide assistance to students in the form of explanations and directed questions. The teacher explains the intent of the hypothesis and how to formulate the hypothesis, explains the variables and how to identify the variables. Teachers can give explanations using the language commonly used in this study (Joyce, et al., 2009; Supeno, 2016).

The implementation of the third phase was assessed by 2 observers as having a good category with an average value presented of 3.2 and a match percentage of 76.7%. The implementation of the third phase with a good category is supported by the student response questionnaire presented, which states that 100% of students feel that they have just formulated a hypothesis. The fourth phase, encourages learners to collect data to test hypotheses. By conducting experiments learners can collect

data to test hypotheses that have been formulated. During the experiment, the teacher guides the learners to conduct the experiment. The guidance provided by teachers in data acquisition causes learners to focus more on the content being studied (Wu & Krajick, 2006; Hendratmoko, 2016). The implementation of the fourth phase was assessed by 2 observers to have an excellent category with an average score presented in Trial I of 2.8 and a match percentage of 76.1%. The implementation of the fourth phase with categories is quite good.

This data is supported by the percentage of student activity in discussing, expressing opinions, asking questions, and making observations and experiments, has shown a good percentage, meaning that these activities appear in the observation of student activities. It is intended to get used to expressing opinions and constructing knowledge through the investigation and discovery of the learners themselves (with the guidance of the teacher). Ausubel states that the primary function of formal education is to organize various information for learners and present various ideas clearly and precisely (Arends, 2012). Good pedagogy must involve the learner with the situations of the learner himself who conducts the experiment (Nur, 2008a p.21). The description above also shows that the learning tools developed by associating learning with an authentic investigation are in accordance with the needs of the 2013 Curriculum. The need of the 2013 Curriculum is that learning carried out in schools must teach students or involve students in an authentic investigation process (Kemendikbud, 2014). The fifth phase, formulating explanations and/or conclusions. After the students obtained the data from the assessment carried out, the students analyzed the data obtained from the experiment by being given scaffolding in the form of questions to analyze the data. After analyzing the data learners are guided to conclude the experimental data and the conclusions made are connected with the hypotheses that have been formulated in the third phase. Drawing conclusions means making statements that reflect what you have learned from an experiment or observation (Nur, et al., 2013). The implementation of the fifth phase was assessed by 2 observers to have a fairly good category with an average score of 3.0 and 3.6.

The implementation of the learning carried out in Trials I and II was carried out in a very good category. This favors the occurrence of a positive impact on the cognitive learning outcomes of learners . Cognitive learning outcomes consist of LP 2.1 cognitive products, and LP 2.2 cognitive process science. Shows that the results of this representation of science process skills have a positive impact on the neuropsychology of learners.

CONCLUSION

Students learn science process skills with the meaning that exists in the minds of individual students also bring up ways of thinking in accordance with science process skills taught through the representation of science process skills with valid,

practical and effective tools in supporting the science process skills taught. Powerful factors that have a good representation impact in their minds with the meaning of the indicators of science process skills also affect neuropsychological processing with their perspective and way of thinking logically to do a representation of the science process skills given during learning. It is shown in a positive way that they behave in doing questions about science process skills.

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