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Competency Analysis of Student Cognitive in Learning in Elementary Schools

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Abstract

The principle of the guided inquiry learning process interaction emphasizes the interaction between students and teachers, and between students and the environment. Learning as an interaction process means placing the teacher not as a source of learning, but as a regulator of the environment or regulator of the interaction itself, the teacher as the questioner. The purpose of this study was to determine how the effect of the guided inquiry model on improving student conitive comptency. This research was conducted in the even semester of the 2017/2018 academic year, using the pre-experimental design method through one group pretestposttest design. This research was carried out in three stages, namely: giving a pretest questionnaire to obtain the average score of student co-technician competencies, implementing the guided inquiry learning model, and giving the final test (posttest) after learning. The subjects of this study were fourth grade students consisting of 14 male students and 13 female students. The data collection techniques used were observation and tests. Observations were made to observe student activities, while the test consisted of preliminary and final tests used to measure learning success. The assessment instrument consists of an observation sheet filled out by the observer and the test questions consisting of 10 questions. Furthermore, student learning outcomes are processed using the Gain formula (g). Based on the research results obtained, 11 students obtained a Gain value of 0.75 in the high category, and 16 students obtained a Gain value of 0.60 in the moderate category. The overall average value of learning outcomes is 0.65 in the medium category. Thus, it can be concluded that the application of the guided inquiry model can affect science student coginitive.

Keywords: cognitive, competensi, guidance inqury

INTRODUCTION

Education is a conscious and planned process of each individual or group to form a good personality and develop the existing potential in an effort to realize the expected goals and objectives. Natural Sciences is a scientific cluster that studies factual natural phenomena, both in the form of reality or events and their causal relationships (Wisudawati and Sulistyowati, 2014: 22). Natural Science (IPA) is related to how to find out about nature systematically, so that Science is not only the mastery of a collection of knowledge in the form of facts, concepts, or principles but is also a process of discovery associated with natural phenomena occurs in everyday life (BSNP, 2006).

Based on some the opinions of the experts above, it can be concluded that knowledge cannot just be transferred from the teacher's mind to the student's mind. This means that students must be mentally active in building their knowledge structures based on their cognitive maturity. According to Yudsatria and Haryanto (2011) there are three emphases in constructivism learning theory, namely the active role of students in meaningful learning, the importance of making ideas in meaningful learning, and linking ideas with new information received, it can be stated that knowledge is actively built by students so that obtained meaningful learning. Learning is said to be successful if the learning objectives can be achieved, but it is not easy for a teacher to always achieve learning goals without being balanced with innovations in learning.

Based on various experiences and the analysis of some science learning literature, the results of communication and student participation are very low (Said Ali Akbar 2019, Sesmiyanti 2016, Hasan Basri 2018, Sukma Dkk 2016), even the minimum completeness criteria (KKM) for science lessons average is 70 (Sukma et all 2016). The achievement of student learning outcomes that was still low in the last year was evident from the class average of 21 students in last year's daily test results of 65 style material. This was because during the learning process the teacher only taught one way. The teacher only delivers the material. Students only listen to the teacher's explanation, students tend to be passive while the teacher is active so there is no interaction in class. Students do not ask questions and discuss, they are more comfortable chatting with their classmates.

In the concept of style students still find it difficult when relating it to everyday life, because students have never conducted experiments. So to make it easier for students to understand the lesson, efforts are made to improve the quality of learning, namely by involving students directly in learning and training students to be scientific through the research process (experiment) so that students can gain meaningful experiences and students can understand the concept more deeply so that learning outcomes students can improve. One of the alternative science learning strategies on styles material that are suitable for these conditions can improve student learning outcomes is to apply the guided inquiry learning model. The most important learning outcomes are the level of student control followed by other developments such as attitudes and skills, (Chandra Adi Prabowo, Wahyu Widodo 2018).

The communication aspect of children is one of the most important psychological aspects to be understood and appreciated by all educators, because all learning that is held must be in accordance with the level of development of the child's condition, the communication system itself is a complex processing device capable of processing, processing and transmitting information, Dorouich et al. (in Hasan Basri 2018). Every elementary school age child has different abilities, especially in terms of cognitive, some

have reached a high cognitive realm, namely analysis, synthesis, evaluation and some are still in the lowest cognitive realm, namely knowledge. The ability of students in science subjects is closely related to the stage of development of their abilities, so teachers should adjust their teaching methods in class.

Science education is an education that is designed in such a way as to motivate students to be creative in finding their own skills, this is because science education is always in direct contact with the natural reality that becomes the student's environment. Science education must be able to uncover and develop students' overall potential and competence, so that students have the life skills to face all problems and challenges in the future. Learning science is a whole way of thinking to understand natural phenomena as a way of investigating natural events (Jailani et all. 2018).

The importance of developing communication in learning was also echoed by several education experts. Cognitive engagement is the extent to which students' are able to take on the learning task. This includes the amount of effort students are willing to invest in working on the task. Clarke (2002: 133) states that cognitive engagement involves the thinking that students do while engaged in academic learning tasks. It means that, cognitive engagement is engaged students in learning task which related students thinking and knowledge in learning. Furthermore, Sharan and Than (2008: 41) interest. For example, describes that cognitive engagement is related to motivational goals and self regulated learning (in Semiyanti 2016).

Teachers are obliged to be able to create a learning atmosphere that is able to build students' ability to understand lessons in order to achieve optimal results. In addition, teachers must also be able to plan and carry out optimal learning activities, namely designing and compiling established learning strategies. To become a creative, professional and fun teacher is required to have the ability to develop and select effective learning methods. In other words, the right method and considering students' abilities is very important in delivering lessons (Effendi Manalu and Ria Mei Christina Saragih, 2018).

Cognitive development concerns the development of thinking and how the thinking activity works. Cognitive factors have an important role for the success of children in learning, because most activities in learning are always related to the problem of remembering, the importance of developing a convention in line with the mandate of the Minister of National Education Regulation No. 58 of 2009 concerning the content of the early childhood curriculum includes the development of habituation and basic abilities.

Inquiry is a student-centered learning which is proven to be effective in generating conceptual understanding correctly (Suyono, 2014). Research by Sulistina et al. (2010) concluded that guided inquiry learning is more effective than open inquiry, it can be seen from the higher mean score of guided inquiry students' cognitive learning outcomes than open inquiry. Guided inquiry as a learning model involves the process of investigating nature or natural matter, in order to answer questions and make discoveries through investigations to gain new understanding. According to Sanjaya (2011) the guided inquiry learning strategy is a series of learning activities that emphasize critical and analytical thinking processes to seek and find answers to the problem in question. The thought process itself is usually carried out through question and answer between teachers and students. The guided inquiry model is a learning

process that is built on the questions asked by students. Students are encouraged to collaborate in solving problems, rather than just receiving direct instructions from the teacher.

Furthermore, Maniotes (2018) adds that guided inquiry encourages students to gain deeper knowledge about subjects through asking questions and conducting more thorough research, the role of teachers in guided inquiry learning as providing guidance and direction to students. In general, guided inquiry is a varied process and includes the activities of observing, formulating relevant questions, evaluating, planning investigations or investigations, reviewing what is known, carrying out experiments or experiments using tools or obtaining data, analyzing and interpreting data and making predictions. and communicate the results. This is also in accordance with what was expressed by Eggen and Kauchak (in Trianto, 2007: 69) as follows:

Table 1. Indicator of Teacher Role

Indikator	Teachers Role		
Presents a question or	The teacher guides students to identify problems		
problem	and write them down on the board		
Make a hypothesis	The teacher divides students into groups		
Designing experiments	The teacher provides students with brainstorming		
	in forming hypotheses		
Conducting experiments to obtain data	The teacher guides students in making hypotheses relevant to the problem and prioritizes the		
	hypothesis that will be used to become a priority		
	for the investigation		
Collect and analyze data	The teacher provides the opportunity for students		
	to determine the steps in accordance with the		
	hypothesis to be carried out		
Make conclusions	The teacher guides students in determining the experimental steps		
	Presents a question or problem Make a hypothesis Designing experiments Conducting experiments to obtain data Collect and analyze data		

Source: Eggen and Kauchak (Trianto, 2007:69),

With the above understanding, the application of inquiry in learning in principle is to carry out learning that is oriented towards intellectual development, the development of thinking skills with orientation to learning outcomes as well as through the learning process. The criterion for the success of this process is not determined by the extent to which students can master the subject matter, but the extent to which students seek and find it.

The principle of the guided inquiry learning process interaction emphasizes the interaction between students and teachers and between students and the environment. Learning as an interaction process means placing the teacher not as a source of learning, but as a regulator of the environment or regulator of the interaction itself, the teacher as the questioner. Thus students will improve their thinking skills. Students will develop the entire brain, both the left brain and the right brain optimally. Openness in learning is a process of trying out possibilities, anything is possible.

Therefore, children need to be given the freedom to try according to the development of their logical and reasoning abilities. The teacher's task is to provide space to provide opportunities for students to develop hypotheses and openly prove the truth of the proposed hypothesis, Sanjaya (2010: 199). Inquiry learning models have a

positive impact on teaching and learning activities, which can increase student activity during learning, improve the achievement of learning outcomes, and can increase student interest in following the learning, Byrne et al. Sriarunrasmee e al. 2015; Lange, 2018, 2018 in Said Ali Akbar, 2019), Inquiry was chosen as the basis for the development of the model, because according to Arends (2012) the inquiry model is a model developed for the purpose of how students think, so that there is potential to train students' critical thinking skills (in Saiful Prayogi, Muhali, 2016).

In other words, guided inquiry is a process of obtaining and obtaining information by conducting observations or experiments to find answers or solve problems to questions or problem formulations using critical and logical thinking skills. The thought process itself is usually carried out through question and answer between teachers and students. The reason for using the guided inquiry model is that by discovering for themselves about the concepts being studied, students will better understand the science, and the knowledge will last a long time.

By using the guided inquiry learning model students can construct knowledge through experiments, the process of thinking and asking questions, and with the combination Between learning motivation and choosing the right learning model is expected to improve student learning outcomes, guided inquiry is not able to improve the realm of student communication besides this model is also able to motivate students in learning, in the sense that it can move someone or stimulate someone to do something marked by the emergence of "feeling "in order to achieve a goal. Learning outcomes are abilities that students have after carrying out an action or interaction of learning activities that can be assessed based on the cognitive, affective and psychomotor domains. With guided inquiry learning, it will generate student learning motivation so that it can affect the achievement of student learning outcomes (Sukma, Laili Komariyah and Muliati Syam, 2016).

According to Trianto (2007: 23-24) each learning model has its own advantages and disadvantages. The advantages of guided inquiry are that the learning model changes from presenting information to information processing, teaching changes from teacher centered to student centered, the teacher is more guiding, can form and develop self-concepts in students, can deepen the material being studied, last long in memory, enabling students to learn by utilizing various types of learning resources that do not only make the teacher the only learning resource. While the lack of guided inquiry is that it requires a change in the learning habits of students who receive information from the teacher as it is to become independent and group learning by seeking and processing information on their own. Changing habits is not an easy thing, especially a habit that has been for years.

Teachers are required to change the learning package, which is generally used as a presenter of information, to become facilitators and motivators. This is a difficult job because generally teachers feel that they have not taught and are not satisfied if they do not convey information (lectures). In practice, this model provides adequate learning resources and facilities that are not always available, especially inefficient for teaching

large numbers of students while the number of teachers is limited. Meanwhile, to overcome the shortcomings of implementing the guided inquiry model, what can be done is to cultivate habits in students to form independent learning methods and provide an understanding that learning resources are not only teacher-centered, teachers need to practice listening and position themselves as facilitators for students during learning, overcoming large classes, students should be divided into groups.

Learning that has been developed is based on student centered, namely student-centered learning. However, in reality, most of the learning activities that have been carried out are teacher centered. In this lesson the teacher provides a lot of information, students are given less time to put forward ideas, provide experiences - abstract experiences, give less time to solve problems, and homogeneous learning. This results in low student achievement at the local and global levels (Inquiry Journal Vol 2, No 2 2013: 155, in Sukma, Laili Komariyah and Muliati Syam 2016). Besides, mastery of the material for the teacher can also determine student competence. The low ability of teachers to master learning material is the cause of the low quality of learning outcomes that is being improved (Zainuddin, 2018).

With various advantages as mentioned earlier, it is very interesting if this method is considered in learning and various other studies to analyze the various possibilities and potentials of students at various levels of education including at the primary school level as in this study, as for the purpose of analyzing how Student competence in learning with guided inquiry model.

RESEARCH METHODS

This research was conducted using the pre-experimental method. The research design used was a one-group pretest-posttest design that used one experimental group or treatment group and did not use a comparison group. This research was carried out in three stages, namely: (1) finding the average value of the students' positive before the action was taken in learning, (2) implementing the guided inquiry learning model, and (3) giving the final test after learning. In this design, observations were made twice, namely before the experiment and after the experiment. Observations made before the experiment (O1) were carried out to find the average value of the students' cognitive and observations after the experiment (O2) were called posttests. The difference between O1 and O2, namely O2-O1, is assumed to be the effect of treatment or experimentation as described by experts (Arikunto, 2006). For more details, the research design can be seen in Table 1 below.

Tabel 2
Desain *Pre-test and Post-test Group*

Group	Average Conitive	Treatment Coqnitive	Posttest
Eksperimen	O_1	X	O_2

(Source: Sukardi, 2004).

Information: O1 = Initial observation (before experiment), O2 = Final observation (After experiment), X = There is treatment (Treatment).

Population and Research Sample

The population in this study were all students of SD Negeri Meunasah Tutong. Meanwhile, the sample in the study were the fourth grade students of SD Negeri Meunasah Tutong, totaling 24 students consisting of 14 male students and 10 female students.

The data was collected using test instruments and observation sheets. The test instrument to obtain student positive values has been through various lessons and posttest to determine student learning outcomes. Followed by an observation sheet to determine student activities and the implementation of the guided inquiry model.

Data analysis was carried out by comparing the set KKM (Minimum Completeness Criteria) value of 70 (according to the KKM enforced at SD Negeri Meunasah Tutong). Therefore, students are said to have completed their learning if the acquisition of learning scores is \geq 70. On the other hand, students are said to have not finished their learning if the student's score is <70.

Penentuan akhir perbaikan diamati melalui *pretest-postest* menggunakan tolak ukur kriteria ketuntasan klasikal. Kriteria ketuntasan klasikal kelas dikatakan tuntas belajarnya jika dalam kelas tersebut terdapat ≥ 85 % telah tuntas belajarnya. Penilaian untuk presentase ketuntasan belajar klasikal dihitung menggunkan rumus *gain* (*g*) sebagai berikut:

$$g = \frac{posttest - pretest}{maximum\ value - pretest}$$

Table 3 *Gain Category*

Gain	Improvement Criteria	
g < 0,30	Low	
$0.30 \le g \le 0.70$	Moderate	
g > 0.70	High	

(Source: Meltzer, 2002)

RESEARCH RESULTS AND DISCUSSION

1. Implementation of Guided Inquiry Model

In this study, data on student learning outcomes for style material were obtained from the instrument test scores which captured the students' positive and post-test values. Previously, researchers had prepared a Learning Implementation Plan (RPP) that applied the guided inquiry learning model, media / tools and materials in learning, Student Worksheets (LKS), observation sheets, field notes, and test instruments in the form of multiple choice questions. The pretest instrument is used to find out how much the students' initial ability before learning is carried out with the guided inquiry model, while the posttest instrument is used to determine student learning outcomes after learning takes place.

The first phase in implementing the guided inquiry model is to formulate a problem, where students are faced with problems given by the teacher. The second phase is formulating a hypothesis, namely the teacher guides students to formulate hypotheses

(make hypotheses) based on the formulation of problems made by the teacher. The third phase collects data, namely the teacher guides students in conducting experiments (experiments). The fourth phase tests the hypothesis, namely the teacher guides students in analyzing data (determining answers) based on data collection that has been obtained in experiments or experiments. The fifth phase formulates a conclusion, namely the teacher guides students in concluding the experimental data they have obtained. During the learning process the teacher goes around to each group to provide guidance and assessment to each group. The teacher gives a time limit to complete the worksheets. After the set time limit runs out, each group collects their work. Then the teacher asks representatives of each group to come forward to present the results, other students pay attention to them, teacher and students conclude together. Then the teacher evaluates in the form of questions and answers to the styles material that have been taught.

1. Student Coqnitive Test Results

From the pretest data analysis, it was obtained that the highest score for the student questionnaire was 80 and the lowest score was 40. After the implementation of the guided inquiry model was carried out, the researcher gave postest questions. The aim is to see the increase in the competency scores of these students after being given the material using the guided inquiry learning model. The results obtained are that the highest score of the student is 100 and the lowest score is 70. The recapitulation of the results of the student technician competency test can be seen in Table 3.

Table 4
Research Results

No	Students Name	Conitive	Value of	N-Gain	Information
		Average	Treatment Conitive		
1	A1	60	90	0,75	High
2	A5	80	100	1,00	High
3	A9	70	100	1,00	High
4	A15	60	100	1,00	High
5	A13	50	90	0,80	High
6	A4	60	90	0,75	High
7	A7	60	90	0,75	High
8	A11	60	90	0,75	High
9	A17	60	90	0,75	High
10	A19	60	90	0,75	High
11	A25	60	90	0,75	High
12	A10	50	80	0,60	Average
13	A16	50	80	0,60	Average
14	A18	50	80	0,60	Average
15	A20	50	80	0,60	Average
16	A23	50	80	0,60	Average
17	A24	50	80	0,60	Average
18	A2	60	80	0,50	Average
19	A6	60	80	0,50	Average
20	A8	60	80	0,50	Average
21	A12	40	70	0,50	Average
22	A14	60	80	0,50	Average

	Average	55,18518519	83,33333333	0,65	
27	A3	50	70	0,40	Average
26	A27	40	70	0,50	Average
25	A26	40	70	0,50	Average
24	A22	40	70	0,50	Average
23	A21	60	80	0,50	Average

Source: 2018 research results

Based on Table 2. above, it can be seen that the details of the research scores of Class IV SD Negeri Meunasah Tutong Aceh Besar which have a value of 0.75 to 1 are 11 students in the high category, while those who have a value of 0.50 to 0.60 with the medium category as many as 16 people. So it can be concluded in terms of the level of completeness that the learning outcomes of the fourth grade students are complete.

Then the data from the pretest and posttest were analyzed with the Gain formula (g), the aim was to see the improvement in student learning outcomes using the guided inquiry learning model..

Table 5
Classification of test results

No	N-Gain	Kategori	Frekuensi	Persentase
1	g < 0,30	Low	0	-
2	$0.30 \le g \le 0.70$	Moderate	11	40,7 %
3	g > 0,70	High	16	59, 2 %
	Amount		27	100 %

Source: 2018 research results

The results obtained were in fact the overall average score of the students' skills was 0.65 in the moderate category. In accordance with the author's hypothesis, the application of the Guided Inquiry learning model can improve the results of student competency skills. The score is classified into three gain categories, where if the results obtained are g < 0.30 the criteria for a low increase, while the results obtained are $0.65 \ge 0.30$. So the implementation of the Guided Inquiry Model in Class IV SD Negeri Meunasah Tutong Aceh Besar can affect the improvement of student learning outcomes. This is in line with the results of research by Damayanti (2014) which states that the application of the inquiry learning model in science subjects can improve the learning outcomes of fourth grade students at SDN Kromong Jombang, this can be seen from the cognitive learning outcomes obtained from classical student learning completeness. 33.67%. Furthermore, Jundu, et al (2020) added that there was a significant effect of using the guided inquiry learning model on student science learning outcomes in disadvantaged areas. Thus learning, regardless of the conditions and location, needs efforts that are in line with the objectives and various policies.

Thus learning according to national education system laws number 20 of 2003 is defined as a process of interaction between students and educators and learning resources in a learning environment. The learning process applied to the 2013 curriculum is student centered (student centered active learning), the nature of contextual learning, and

textbooks contain learning materials and processes, assessment systems and expected competencies (Nurainun, et al. 2018)

CONCLUSION

Based on the results of data processing, it has been obtained that the average value of the results of student and post-test kemamouan is 0.65 in the moderate category, which has a value of 0.75 to 1 as many as 11 students in the high category, while those with a value of 0.50 to 0 , 60 in the medium category as many as 16 people. So it can be concluded that the learning outcomes of the fourth grade students are complete. This shows the impact of increasing student learning outcomes. The score is classified into three gain categories, where if the results obtained are g < 0.30 the criteria for a low increase, while the results obtained are $0.65 \ge 0.30$. So the application of the guided inquiry model in Class IV SD Meunasah Tutong Aceh Besar can affect the competence of student cogicans in learning.

The learning process is a core activity. whose components influence each other, namely the desired indicator goals, the material taught, teachers and students, the types of activities carried out and the facilities and infrastructure available. Therefore, the selection of the right teaching model by teachers must be further improved and explored so that it can support the achievement of the expected goals, especially the various competencies of students. Things that need to be observed about the preparation of learning tools are enabling teacher interaction with students, student learning interests, different student thinking and how the teacher manages the class well so that learning objectives are achieved in the expected learning process, especially in developing optimal student coordination.

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