

Improving Critical Thinking Skill of Elementary School Students Through Brain Based Learning

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ABSTRACT

The purpose of this study was to improve the critical thinking skill of elementary school students using Brain Based Learning in PAI subject. This study implemented Brain Based Learning starting from planning, implementation and evaluation. The material developed was integrated with social cases of daily life. This study was conducted at the Rabbi Radiyya Islamic Elementary School and Public School No. 02 of Rejang Lebong. The research design used was one group pretest-posttest design, with data analysis using the N-gain test. The data collection was conducted through tests of critical thinking and observation of student activities. The results of the posttest and pretest showed an increase in students' critical thinking skill. The first post-test obtained an increase of 21% and the second 24%. The result of the N-Gain analysis showed the critical thinking ability in PAI learning of student in the rounding material and the scale increase from the first pretests of 0,42 and the second pretes of 0,52 at SD IT Rabby Radiyya (RR). Then in SD 02 RL the first post-test obtained an increase Of 21% and the second 32%. The result of the N-Gain analysis showed the critical thinking ability in PAI learning of student in the rounding material and the scale increase from the first pretests of 0,39 and the second pretes of 0,62 at SD IT Rabby Radiyya (RR), of the two result indicate N-gain in the medium category. Therefore, PAI learning through Brain Based Learning was effective.

Keywords: *Brain based learning, Critical thinking, PAI learning*

1. INTRODUCTION

Islamic education has a role to optimize all human potential. Human potential boils down to the brain. The application of neuroscience in Islamic education aims to produce intelligent humans (*insan kamil*) in cognitive, affective and psychomotor areas (IQ, EQ, SQ) [1]. Elementary school is a formal educational institution that needs to be considered in order to determine the success of education at the next level. Elementary schools function to provide basic knowledge, attitudes and abilities to students. Therefore, elementary schools provide several subjects. PAI is a subject that has an important role in shaping students' intellectuals, including their critical thinking skills.

PAI is one of the boring and less attractive subject for students, so the expected learning outcomes are not optimal. This is partly because the PAI content is taught textually, and the traditional methods such as

memorizing and lecturing are used more dominantly. This research was conducted to create meaningful learning, by integrating the social aspects of students' daily life into PAI content so that students' critical thinking skills grow. According to Rohina [2], the meanings of the verses of the Qur'an need to be integrated with the social cases of life to make it easier for students to process, analyze and implement them in their daily activities.

PAI learning focuses on developing human potential as a whole including spiritual, intellectual, emotional and physical aspects [3]. PAI aims to change the behavior of individual students in their personal life, society and nature [4]. Therefore, PAI learning must be integrated with the daily life of students so that it can foster meaningful knowledge and experiences in personal life, society, nation and state [4]. The learning process of Islamic Education based on the social context of everyday life is an alternative that touches the intellectual, social and

emotional realms of students [5]. The material stimulus was taken from stories and events in students' daily lives. Through the learning process of cases developed, students can describe arguments, analyze, find and draw conclusions as lessons learned from the learning delivered.

This process has changed the mind set of teachers who still think that students don't know anything, even though children have the potential of all the intelligence and strength they were born with. Teacher creativity is needed to strengthen this potential by involving students' thought processes during learning. The process of improving critical thinking on PAI material needs to be pursued through a good model of religious education development so that it can influence students' choices, decisions, and life development [6]. The result of research conducted by Rouf [7] showed that the practice of PAI at school (generally) has not integrated social life content maximally, and the assessment has not included all three aspects (cognitive, affective, psychomotor) comprehensively.

In realizing the learning process according to the needs of students, a model design is needed that is systematically compiled as a conceptual or operational framework, which contains systematic procedures for organizing learning experiences and as a guide for teachers in planning and carrying out learning activities. In line with Trianto's [8] opinion, the development of learning models is the process of making a systematic learning design in the form of conceptual, procedural and physical models as guidelines for carrying out learning activities in order to realistically meet learning needs to achieve predetermined goals.

Critical thinking is reasonable thinking and reflection that focuses on deciding what to believe or do [9]. According to Facione [10], critical thinking is self-regulation in judging something to produce interpretation, analysis, evaluation, and inference as a basis for determining a decision. This is in line with the results of research conducted by Wulandari [11] that showed that the application of PAI learning design based on Brain Based Learning was able to improve critical thinking skills and student learning outcomes. Then, Sihotang [12] states that critical thinking is the skill of arguing rationally to find the truth of a view. It can be concluded that, "critical thinking involves thinking reflectively and productively and evaluating the evidence" [13].

One of the alternative solutions to improve the quality of PAI learning and increase the critical thinking skills of students in elementary schools is the need to make learning becomes fun and applicable with the real world. This is based on the concept that

critical thinking is a logical consequence of brain-based learning which involves thinking ability to respond and present arguments [14]. The results of research conducted by Wulandari [15] showed that PAI based on Brain Based Learning can improve critical thinking skills and student learning outcomes. Then, the results of Duman's [16] research found that Brain Based Learning is more effective at increasing student achievement than traditional learning approaches. Therefore, Brain Based Learning is effective at creating student success which in turn creates positive student perceptions [17].

Based on the explanation above, we can see that Brain Based Learning with critical thinking skills are related and complementary. Critical thinking skills are applications that require habituation and operational training, while Brain Based Learning facilitates students to display a learning process that is fun and meaningful cognitively, emotionally, socially, actively and reflectively. So, learning PAI requires something contextual to make learning more real and students get meaningful learning experiences.

Fun and meaningful learning is very important in learning. This condition is in accordance with Ausubel's theory of meaning. This is also in accordance with Given's statement [18] that brain-based learning is multidisciplinary learning which is a combination of emotional, social, cognitive, active and reflective aspects. Then it is reinforced by the results of research by Elyusra [19], that the Advance Organizer-based Brain Based Learning model can increase the concentration, activeness, motivation, and cognitive of students. Likewise, the results of the dissertation research by Sesmiarni [20] show that there is a significant increase in learning outcomes in students who are facilitated by a brain-based learning model. Based on these data, PAI learning will be easier to understand and last longer in students' memories if the process is based on needs and implemented through learning strategies that are interesting, active, and challenging.

In short, brain-based learning can improve critical thinking skills and student learning outcomes and naturally make students active, motivated, work well together and have the courage to express opinions, reason and process material in a fun way. This opinion is also supported by Palitano & Paquin [21], "Brain based learning is a natural, motivating, and positive way of maximizing learning and teaching, it is an approach that is based on the ways our brain learns best". Learning activities through Brain Based Learning makes students abstract perceptions becomes more concrete [22] because through Brain Based Learning, students learn PAI in real terms and immediately know the use of PAI in their daily lives.

2. METHOD

This research is a development research that applies the Brain Based Learning learning model to improve the critical thinking skills of elementary school students. The research approach used is descriptive-quantitative. This research approach is used to investigate the implementation of Brain Based Learning starting from planning, implementation and evaluation. The subjects of this study were students of SDIT grade V Islam Rabbi Radiyya and SD 02 Rejang Lebong semester II 2019/2020. Total subjects are 41 students. PAI material which was developed is about "Q.S AL-Ma'un".

The research design used for the trial was a one group pretest-posttest design, with a research instrument in the form of a set of questions used to measure students' critical thinking skills with a Brain Based Learning approach and a questionnaire to assess student activity. This research was conducted 4 times, and pretest and posttest were conducted twice to determine the increase in students' critical thinking skills. The multiple choice questions test consists of 15 questions, while the student activity questionnaire consists of 10 questions. The pretest and posttest design can be described as follows;

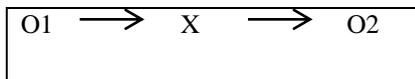


Figure 1. One Group Pretest-Posttest Design [23]

Explanation:

- O1 = pretes (before treatment)
- O2 = posttest (after treatment)
- X = treatment

The improvement of students' critical thinking in Islamic Education lessons is interpreted using N-gain analysis by Hake [24] with the following categorizations.

Table 1. The categorization of normal N-Gain

Value N-gain	Criteria
0,00 < N-gain < 0,30	Low
0,30 < N-gain < 0,70	Medium
N- gain > 0,70	High

3. RESULT AND DISCUSSION

The results of document review on 10 teachers in planning PAI learning in elementary schools are still guided by the old planning, specifically, the researcher saw some evidence including; (1) the teacher made

plans not based on objectives, but still based on the material to be delivered; (2) SK and KD were written in accordance with the 2013 Curriculum, but the formulation of indicators was still not operational; (3) In determining learning strategies and methods, researchers generally see one type, namely lecture; (4) The planning prepared by the teacher had not made use of environment-based learning resources that were in accordance with KD, material and student development levels; and (5) student organization was still in classical form by sitting in a row.

The learning process of PAI based on Brain Based Learning is carried out as an alternative to overcome this condition. Brain Based Learning model to improve students' critical thinking skills was carried out by planning, implementing and evaluating stages. The application of the model can be seen clearly in the

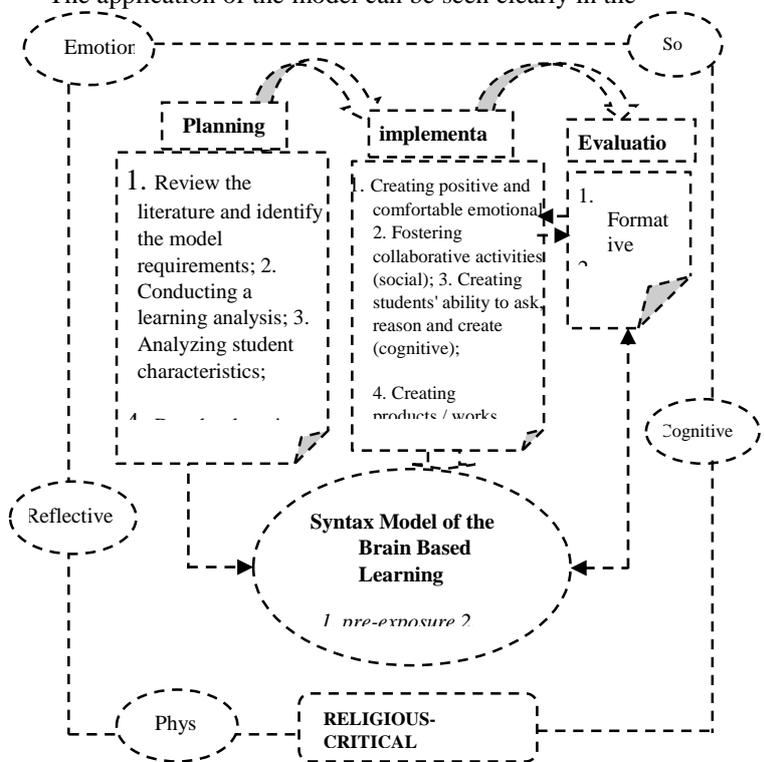


Figure 2 The learning process of PAI based on Brain Based Learning

Based on Figure 2, it shows three steps in the development of PAI learning materials based on Brain Based Learning, namely planning, implementation; and evaluation.

The planning stage is carried out to obtain information about Islamic Education learning. This study includes a literature review and field observations. Literature review is a study of various relevant theories so as to find a theory that supports the need for model development. Meanwhile, field

observation is an activity to identify the learning needs needed by teachers and students. These observations were made through teacher and student interviews.

Broadly speaking, there are several things that are done during the field study, namely: (1) Conducting a learning analysis; (2) Identifying student behavior and characteristics; (3) Develop learning strategies; (4) Preparing syllabus and lesson plans; (5) Determining the material and worksheet; and (6) Designing Evaluation tools.

The implementation stage is the second stage after planning, starting from: (1) Creating positive and comfortable (emotional) emotions; (2) Fostering cooperative activities (social); (3) Creating students' ability to ask questions, reason and create (cognitive); (4) Creating (physical) products / works; (5) Able to conclude (reflection). At this stage, the steps taken by the teacher are explained to be able to recognize student characteristics with regard to the uniqueness and tendencies of learning styles possessed by students as part of Brain Based Learning learning.

The evaluation stage is the stage of creating student success which in turn creates positive student perceptions that have an impact on the achievement of good learning objectives as defined, namely increasing students' critical thinking skills in Islamic Education lessons in class V Elementary School through formative tests and the resulting performance.

In its application, syntax learning was made to make it easier for teachers to carry out each process. The syntax for PAI learning based on Brain based Learning starts from preliminary activities, namely: (1) pre-exposure; (2) preparation; core activities, namely; (3) initiation and acquisition; (4) elaboration. (5) incubation / inserting memory; (6) verification; and closing activities, namely; (7) celebration and integration.

In the pre-exposure and preparation activities, the activities carried out were preparing students to receive learning by arousing positive emotions so that students were emotionally comfortable, and the teacher used affirmation words or simple Brain gym or songs to arouse students' enthusiasm. At this stage the teacher also conveyed learning objectives and displayed learning topics for students to think about.

The core activities consist of initiation and elaboration. The activities were: (1) the teacher began to provoke the thinking power of students by giving students cases / questions, (2) the teacher linked the material with the previous lesson; (3) the teacher gave students the opportunity to personally study, expressing opinions based on their experiences in a simple manner; question and answer; (6) the teacher found/looked for alternative solutions to a case.

The next activities were Incubation and Verification. The activities included (1) the teacher formed a room for group discussion, (2) the students conducted experiments related to the problems / material provided by the teacher; (3) the teacher provided the opportunity to interpret arguments, ask for ideas, discuss, evaluate, clarify, and conclude (communicate) the results of the discussion of the material. (4) The teacher gave students freedom of opinion and allowed them to feel overwhelmed in processing the material; (5) the teacher provided brain stretching activities with some simple Ice Breaking to relax and overcome student tension.

At this stage, the teacher as a facilitator was in charge of controlling the discussion and presenting innovative learning resources to sharpen students' understanding, including presenting concrete cases based on the real-life realities of students as stimuli, and presenting information from several sources such as from stories, video / film magazines, newspapers, news etc.

The closing activities consist of celebration/integration. At this stage the teacher and the students make interpretations / conclusions in learning including; (1) Conducting tests to obtain information on learning achievement; (2) Appreciating student performance by displaying their work; and (3) Providing feedback to assess the extent to which learning progress has been achieved.

3.1. Student Activities in PAI learning based on Brain Based Learning

Observation of student activities in the application of the PAI learning model based on Brain Based Learning to increase critical thinking skills was carried out by researchers themselves. This was because PAI teachers in elementary schools who were the objects of research were asked to collaborate in displaying the PAI learning process because the learning process that used Brain based model learning was still new, so direct assistance was required for the teachers. The results of the analysis of student activities in developing the Brain Based Learning model are shown in Table 2.

Based on the results of the above observations, an average of 34.00 was obtained in the good category. This shows that the learning objectives were achieved and made students active during learning. According to Sita's research [25], students are said to be active when the overall activity is above 50%. Students also seemed to be active in following all the learning steps according to the Brain Based Learning syntax. Increases also occurred when group discussion activities included providing responses, analyzing material, asking questions and showing problem

solving to given cases, so that the implementation of Brain Based Learning based learning on PAI material could improve students' thinking abilities. Learning activities are effective and meaningful when students actively contribute and are involved in the learning process. Activities are indispensable in learning activities, as Hidayah & Indriayu [26] states that the learning process will take place effectively if students are actively involved, have effective tasks and interact with the subject matter intensively.

These results were obtained after the teacher carried out the change process starting from the learning planning stage to the learning implementation application. Teachers have also used a student-based learning approach (student center), as a result students are no longer passive in class, stiff and fixated on learning. They interact and move flexibly in learning, and the teacher has made movements to approach the students where they are sitting.

Judging from the learning methods used, the teacher has done a variety of methods such as groups, work projects and experiments. In addition, the delivery strategy includes, among others; Learning media have been used in accordance with the form of the material and competency outcomes. Including learning management strategies that include scheduling the use of learning strategies, making notes on student learning progress, managing motivational and developing procedures for measuring learning outcomes that have been carried out as needed.

The Increase of Students' Critical Thinking Ability

Based on the results of the posttest which was carried out in elementary school grade V, the results showed the increase of students' critical thinking skills in PAI subjects using Brain Based learning in each given posttest. To find out the extent to which students' critical thinking skills increased in PAI learning, before the PAI learning process based on Brain Based Learning was implemented, students were first given a case as a stimulus to arouse curiosity so that thinking powers were provoked and became a sustainable culture. The stimulus was integrated from the social context of the students' daily lives. Stimuli developed in the form of short stories, stories, daily news from newspapers, regional magazines as well as past history and current events were presented closer to the students. In the learning process, students could identify causes, provided simple arguments and expressed reasons, and made decisions about what was best to do from these activities. Then, the students were given a critical thinking ability test. The results of the increase in students' critical thinking skills based on the tests carried out were presented clearly in the following table;

Table 2. Result of students activities in brain based learning

No	Student Activities	Observation result			Criteria
		1	2	3	
1	Identifying problems based on worksheets			4	Very good
2	Asking questions as a form of curiosity			4	Very good
3	Finding simple reasons regarding given cases		3		Good
4	Gathering information through various literatures from libraries, journals and the internet	2			Enough
5	Showing simple solution to a case		3		Good
6	Cooperating in finding answers to problems as a group		3		Good
7	Conducting discussions according to cooperative procedures			4	Very good
8	Responding well to other students' opinions without discriminating against race (friends)			4	Very good
9	Collecting and demonstrating the impact of a case from the experimental results in a simple way.		3		Good
10	Presenting group work results		4		Good
	Total Activity Journal	2	16	16	34,00

Table 3. Summary of result critical thinking ability test

	Average of Pre test		Average of Post-test	
	1	2	1	2
SD IT RR	28,57	46,03	58,41	77,14
% Increased		38%	21%	24%
N-gain			0,42	0,52
SD 02 RL	23,33	42,00	53,33	78,33
% Increased		44%	21%	32%
N-gain			0,39	0,62

Based on the data above, it can be seen that the average pretest score is still low. This is because students were not used to doing critical thinking questions. In addition, the critical thinking questions presented had a case stimulus that requires students' reading culture (literacy) to be improved. Even so, from the data presented, it seems that there was an increase from the first pretest to the second pretest of 38% at SD IT RR, and 44% at SD 02 RL although the increase is not so significant. Furthermore, the students were given a learning process based on Brain Based Learning to improve thinking skills in each posttest. So it can be seen that the average posttest score increases on each test because students had started to get used to critical thinking questions and was strengthened by the implementation of learning with the use of visual and audio visual, stories and stories that made students felt like experiencing themselves when reading questions of critical thinking.

In the first posttest, PAI critical thinking questions were arranged with the distribution of material from several fractional sub-chapters to determine the readiness of students in receiving questions from the material previously presented by the teacher. The results of the first posttest showed that the average score was sufficient but not maximum, even though the increase in the previous pretest average score was 21% at SD IT RR and 21% at SD 02 RL. This is because students were getting used to the contextual PAI problems that were presented as a stimulus. However, in this first post-test, the students were not

too prepared with critical thinking questions that contained the distribution of material from several fractional sub-chapters, so that students did not focus because the context was everyday learning where students usually only got one sub-material.

Furthermore, this Brain Based Learning model was effective after the questions were design for one sub-material about understanding the meaning of Q.S AI Maun. The students obtained the average score which was better improved than the first posttest. This was because the material given focused only on one material, and students began to get used to critical thinking problems. In the second posttest, there was an 24% at SD IT RR and 32% at SD 02 RL increase in the first posttest. While the results of N-Gain on the first pretest-posttest obtained 0,42 at SD IT RR and 0,39 at SD 02 RL, the second pretest-posttest obtained 0,52 at SD IT RR and 0,62 at SD 02 RL, and both are in the medium category.

Based on observations made from the start, it is known that students look very happy with the PAI learning process using this Brain Based Learning model. They appear to be more active, enthusiastic and passionate when learning with methods that are not monotonous, involvement in processing material, PAI content that presents stories, stories from daily activities that make students easy to analyze, respond and express their ideas when the learning process takes place. The effectiveness of the BBL learning model can also be seen from the responses of students during the learning process.

4. CONCLUSION

PAI learning which was carried out using Brain Based Learning in this study was generally implemented in three stages, namely, planning, implementation and evaluation. Each stage was properly carried out in accordance with the Brain Based learning steps. This can be seen from the results of observations of student activity in the good category that means students actively participate in PAI learning using Brain Based Learning to improve critical thinking skills. This means that this model has a positive impact on PAI learning. In addition, the improvement of PAI learning based on Brain Based Learning can be seen in the two posttests, as well as the normalized N-Gain results which is in a high category.

Based on researchers' observations during the learning process, the thing that teachers must do to support the effectiveness of the implementation of PAI learning using the Brain based Learning model is that the teachers should have an understanding of brain theory. The Brain Based Learning Model for learning in schools requires teachers to present

innovative learning resources based on their surroundings. An understanding of multidisciplinary Brain Based Learning makes this model not rigid to be applied to other PAI sub-materials. Various learning methods can be applied in the Brain Based Learning model both indoors and outdoors.

The advantage of this Brain Based Learning model lies in the characteristics of a system-oriented model, which can be a reference for any new models that will be developed, showing the stages arranged in detail. These advantages make the model acceptable and applied to various other PAI sub-materials and have a major influence in the world of education in Indonesia, especially in improving the quality of Islamic Education learning.

The weakness of this model is that when the teacher's understanding about brain theory is minimal, the teacher finds it difficult to recognize students' boredom/ overwhelming learning. If this is allowed, the student's concentration will decrease along with the fatigue they experience, so that the learning process continues without giving the brain a break for a moment. In addition, it is important for teacher to understand the balance of the right and left brain while learning.

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