

Optimization of Brain Function Learning (Neocortex) Through Neuroscience Based on Islamic Literature to Improve Behavior of Primary Students

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ABSTRACT

Deep networks in human brain can develop representations that are a better match to recordings in the neocortex of humans as existing models in neuroscience. This suggests that deep learning captures something important about how our own brains works. Islamic education curriculum neuroscience such as Islamic manners lesson, apply learning methods for the development of intellect learners so in the formation of character can maximize the performance of sense and neuroscience of learning students are given the opportunity to actively construct knowledge through learning, thus neuroscience learning combined with a variety of disciplines so integrated into the mainstream of the formation of character especially character of polite and disciplined through Islamic literacy lesson. This research uses mixed methods these following approaches; Literature study and also Class Action Research in three cycles. The results of these research Educational Neuroscience as one of the fields of study of neuroscience specializes in its studies in the field of education from a neuroscience perspective. In learning Islamic fairy tale literacy which was carried out on 3rd grade students of SDIT Aulady, with three students as the object of this research, 3 models of Islamic fairy tale literacy learning were carried out.

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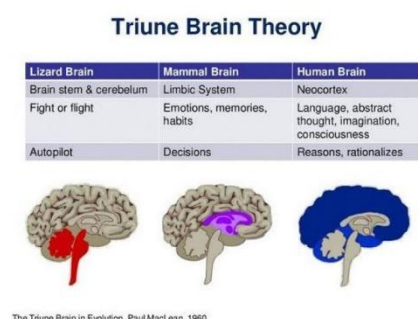
1. INTRODUCTION

Most people tend to think of the brain as a single organ. In 1950, a doctor and researcher named Paul MacLean put forward a controversial new theory, the concept of the "Triune Brain Model". The concept of triune brain is the division of the human brain into three parts.

Paul D MacLean explained that, through evolutionary times, the human brain began to develop and become more complex. According to his research, the human brain has three basic parts: 1. Brain stem or often called the "reptile brain" (R-Complex), 2. The limbic system or "mammal brain", and 3. Neocortex. These three are called the "triune brain", and each part has a different function.

In neuroscience, we will pay more attention to the only part of the brain that is only owned by humans, and not owned by other living things, namely the neocortex. The neocortex is the base of our intelligence. This is what functions to regulate messages received through sight, hearing, touch and smell. The processes that stem from this arrangement are reasoning, intellectual thinking, decision making, sane behavior, language, conscious motor control and idea generation.

The neocortex is also responsible for the ability to speak, create, and create. In this brain also resides a higher intelligence called intuition. This is what distinguishes humans from other creatures. This neocortex allows humans to think about everything, can control their passions and emotions, and be able to behave properly. In short, the neocortex makes humans think intellectually, logically, make decisions carefully, control conscious motor skills and create good nonverbal ideas.



Picture 1. The Triune Brain Theory by Paul Mclean

Neuroscience etymologically is a neural science that studies the nervous system, especially studying neurons or nerve cells with a multidisciplinary approach.

In terminology, neuroscience is a field of science that specializes in the scientific study of the nervous system. On this basis, neuroscience is also referred to as the study of the brain and all the functions of the spinal cord. The main goal of this science is to study the biological basis of every behavior. That is, the main task of neuroscience is to explain human behavior from the point of view of the activities that occur in the brain.

Neuroscience learning has several dimensions including the cellular-molecular dimension, the nervous system, educational social neuroscience and behavioral neuroscience.

As for what we will study here is the social neuroscience of education. This field studies will show how the human "social brain" plays a role in helping humans form relationships with other people. The human ability to establish relationships with other people. Studies of Religion, Science and Technology is its nature that is stored biologically in the brain. While, it is not a well-defined and localized system, the "social brain" has deep roots in the interactions between its various parts. Frontal lobe components, such as the prefrontal cortex, orbitofrontal cortex and ventromedial cortex are the main components responsible for it. Instrumentation of Neuroscience Technology and Its Implications in Learning.

Since the publication of findings in the field of neuroscience, especially facts about children's brains, these findings in the field of neuroscience have led psychologists to conclude that early age (0-6 years) is a golden age. In this case, a prominent psychologist, Howard Gardner stated that children in the first five years are always colored with success in learning about everything. In line with Gardner, Deborah Stipek (in Adi W. Gunawan, 2003) states that children aged six or seven years have high hopes for success in learning everything even though in practice it is always bad.

SDIT Aulady is an Integrated Islamic school in the South Tangerang Region in its curriculum, SDIT Aulady the basic concept, as an Integrated Islamic School (SIT), as quoted from the Integrated Islamic School Network (JSIT) SDIT Aulady implements the concept of Islamic education based on the Qur'an

and As Sunnah. The operational concept of SIT is an accumulation of the process of civilizing, inheriting and developing Islamic religious teachings, culture and Islamic literacy from generation to generation.

The term "Integrated" in SIT is intended as a reinforcement (tawhid) of Islam itself. The point is, Islam that is complete and comprehensive, in all aspects of life. Not only in the form of formal understanding in the school environment but exemplifying it in aspects of everyday life and for example it is shown in one of SDIT Aulady's lesson Islamic Literacy.

The scope of Islamic literacy studied in grade 3 SDIT Aulady include:

1. Literacy of fairy tales of the morality of the Prophets
2. Literacy of civilized fairy tales seeks knowledge
3. Fairy tale literacy is devoted to parents

The question is how to make the 40 minutes of Islamic fairy tale literacy learning time every week to be effective and maximal and each student can enhance the use of the learning brain function, so that will it be followed by behavior change?

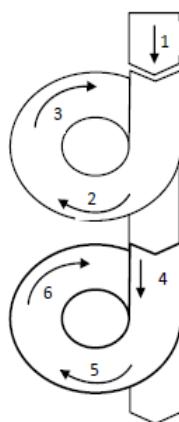
Based on the field analysis, the authors are interested in researching. The purpose of this study is to observe the enhancing of the learning brain function (neocortex) through Islamic story literature to improve the student's manners especially in SDIT Aulady BSD.

2. METHODS

This research uses mixed methods these following approaches; Literature study (library research. Literature study aims to collect and analyze data or information contained in the library room, such as journals, research reports, scientific magazines, newspapers, relevant books, seminar results, scientific articles that have not been published). published, and other scientific data related to the title of this article (Sukardi, 2003).

An exploratory method to analyze the contribution of neuroscience research results in the field of basic education (Arikunto, 2006). The analysis used is psychological hermeneutics with conditions such as objectivity, systematic and general. Sources of data in this study are research results and books that are relevant to the research theme. And using content analysis techniques (content analysis). The approach used in this research is psychology and phenomenology which are theoretically framed in a neuroscience perspective. Psychological and phenomenological approaches are used to reveal the 3rd grade of elementary school children or from playing to learning in Islamic literacy lessso.

This research also using Class-Action Research in three cycles. This research was carried out through several cycles, depending on the achievement of learning effectiveness during the implementation of the cycle. Each cycle carried out meets the criteria as described below:



Picture 2. Kemmis and Taggart Class Action Research Cycle

The neuroscience approach is used as a research perspective as well as a theoretical framework, using 3 learning models, namely virtual group discussions, making fairy tale mind maps and bringing in professional Islamic storytellers.

Data collection techniques used in this study include observation, interviews, and documents:

1. Observations were made to find out how far the influence of the application of contextual approaches in learning mathematics to improve learning effectiveness.
2. Interviews are used to complete the observation data so that the data obtained will be more detailed.
3. Documentation is used to strengthen the observation data.
4. To process and analyze the data in this study, more descriptive techniques were used.

3. FINDINGS AND DISCUSSION

Findings

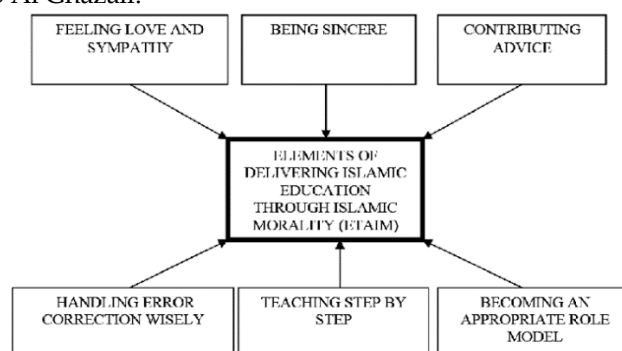
In the basic curriculum, SDIT remains oriented to the Education Unit Level Curriculum, which is a reference from the Ministry of National Education (Depdiknas). However, schools develop according to Islamic values which are the basis of education.

In its application, the Integrated Islamic School applies an implementation approach by combining general education and religious education into a single curriculum. With this approach, all subjects and all school activities cannot be separated from the frame of teachings and messages of Islamic values.

General subjects, such as mathematics, science, social studies, language, physical / health, skills are framed with Islamic footholds, guidelines and guidelines. While in religious lessons, the curriculum is enriched with a contemporary context approach and benefits, and benefits.

Implementation The lessons given are very complete. In the form of general basic education and religious education. The students include Islamic Religious Education, Citizenship Education, Indonesian Language, Mathematics, Science, Social Studies, Cultural Arts, and Physical Education. While other lessons related to Islam are included in the category of Local Content which consists of aqidah manners, qur'an and sunnah. Thus, in everyday learning aspects of moral behavior are highly emphasized.

One of the lessons that exist at every level at SDIT Aulady is Islamic Literacy lesson. This lesson is carried out once a week, at each level from grade 1 to grade 6 with a duration of 1 lesson, which is 40 minutes. This learning is carried out with the principle of Literacy, namely and is carried out with the aim that students can imitate the best manners of Rasulullah Muhammad SAW in everyday life through literacy media of Islamic fairy tales such as Islamic fairy tales. This is in line with the Islamic Learning Framework according to Al Ghazali.



Picture 3. The Framework of Al Ghazali Islamic Learning

So far, the 40-minute lesson per week feels very fast, previous Islamic fairy tale literacy teachers used E-Modules, this e-module really helps teachers in teaching Islamic fairy tale Literacy material to students, besides containing material, it also contains checks. list of Literacy as a student's achievement

that can be assessed by teachers and parents of students if the Islamic fairy tale Literacy material in question is polite moral material to parents.

1. Implementation of Cycle I

a. Description of Action in Cycle I

The action in cycle I begins with the application of learning to develop printed teaching materials using neuroscience theory where students are expected to be in an alpha state when they start storytelling literacy lessons

b. Preparation phase

The initial stage carried out in cycle I was preparation. Preparation begins with preparing a learning plan that will be carried out in storytelling literacy lessons based on the initial data obtained. The learning design was made in two meetings with the main material using the e-module of storytelling literacy and video which was carried out in a virtual zoom class. Namely: presentation materials, draft questions for discussion and learning observation sheets.

Literacy material for Islamic fairy tales compiled at SDIT Aulady, compiled from authentic sources such as the Encyclopedia of Islamic Adab by Sheikh Abdul Aziz bin Fathi As Sayyid Nada, Stories of the wisdom of the Prophets etc.

Muslims who have a human spirit are polite Muslims. Politeness and manners that accompany every step will be able to shape his character. However, not every Muslim understands the meaning of good manners in social and Islamic life.

Literacy itself is according to Kern (2000: 23), literacy is the practice of interpreting the meaning of texts through social, historical, and cultural situations. From some of these explanations, it can be concluded that literacy is the ability to access, understand, and use information as a process of thinking, reading, interpreting and then manifesting it in the form of writing or speaking. According to Kern (2000: 23) there are seven principles of literacy education, namely: (a) literacy involves interpretation, (b) literacy involves collaboration, (c) literacy involves convention, (d) literacy involves cultural knowledge, (e) literacy involves solving problems, (f) literacy involves self-reflection, (g) and literacy involves the use of language. To carry out literacy education that includes interpretation, collaboration, conventions, culture, problem solving, self-reflection and the use of language, it is very important for every student to have. There are many ways to teach literacy education to students, one of which is the School Literacy Movement (GLS).

Etymologically the term literacy itself comes from the Latin "literatus", which means people who learn. In this case, literacy is closely related to the process of reading and writing.

The National Institute for Literacy defines Literacy as "an individual's ability to read, write, speak, calculate and solve problems at the skill level required in work, family and society."

So literacy is not only reading and writing but also having skills and practicing what has been learned so that the knowledge is useful for oneself and society.

At first, the history of literacy was started and taught by the Prophets and Apostles as messengers of Allah SWT. to teach knowledge and guidance to the truth to his people. Prophet Adam's first human. And his wife, Eve, has been given knowledge by Allah SWT. to pass on to their offspring. Then the Prophet Idris as. is the sixth descendant of the Prophet Adam. He is the son of Qabil and Iqlima (son and daughter of Prophet Adam as). Through Prophet Idris as. This is where science begins to develop.

Prophet Idris was the first to be good at reading and writing, fluent in communicating with 72 tribes (with their own dialect). Prophet Idris (as) was agile on horseback, adept at sewing clothes (from animal skins), expert in falaq, mathematics and was active in carrying out various development projects (188 cities were founded). This is in accordance with the origin of the name of the Prophet Idris as "Darasa" which means "study".

Prophet Idris is also referred to as the "Father of Science." Then the Prophets and Apostles (the apostles who have been chosen are only 25 while the Prophets are many) then also pass on literacy knowledge from their predecessors to provide life for mankind. Until the Prophet Ibrahim. as the Father of Civilization and the Father of the Prophets. Because his services to human civilization and especially

Muslims are very large. The previous people did have a culture but did not yet have civilization. Prophet Ibrahim as. teach the science of monotheism, a high sense of tolerance, the field of education, etc. So that Allah SWT appointed him as the Imam / leader of mankind.

Educational Neuroscience as one of the fields of study of neuroscience specializes in its studies in the field of education from a neuroscience perspective.

c. Action Implementation Stage

Learning at the first meeting in the first cycle was held on September 1, 2021. Learning began at 08.00-08.30 WIB with literacy material on the moral storytelling of the Prophet SAW.

In learning Islamic fairy tale literacy which was carried out on 3rd grade students of SDIT Aulady, with three students as the object of this research, 3 models of Islamic fairy tale literacy learning were carried out.

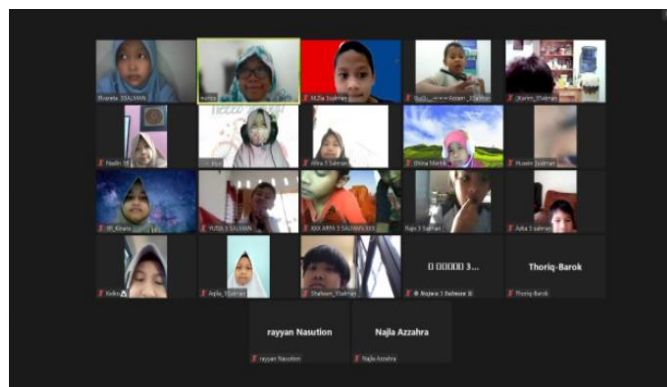
From the 3 learning models of Islamic fairy tale literacy based on neuroscience, it is hoped that they can maximize their learning brain function (neocortex).

2. Virtual Group Discussion learning model.

In this lesson, the 3rd grade students of SDIT Aulady BSD were given a theme of Islamic fairy tale Literacy by the teacher, namely Adab towards parents. These students are given the opportunity by the teacher to discuss what includes Adab with both parents, what are the verses of the Qur'an and Hadith that explain Adab to both parents.

In this model, the teacher acts only as a facilitator, so students are more active in the discussion session. The three students seemed to enjoy the discussion session, although there were times when they did not agree on an example.

For example, when asked by the teacher to discuss the Verse of the Qur'an Surah Al Isra verse 23, do not say "Ah" to both parents. At the end of the discussion they admitted that they sometimes say "ah" to their parents and when they know that in the Qur'an it is not allowed, then they promised never to do it again.



Picture 4. Virtual Discussion 3RD grader of SDIT Aulady

3. Mind Map Method

In this method, the teacher gives time for grade 3 students of SDIT Aulady to create a Mind Map. The students re-presented the material they had previously studied and discussed the previous week, in this model each student presented about good manners, especially Muslim attitudes according to the examples of Islamic fairy tales that we conveyed earlier.

This class 3 Islamic literacy material is very interesting because there are many stories that contain wisdom that can be an example for their lives. Which good attitudes should we imitate and which things are not good we should leave. Students can get to know the Islamic characters of tabligh, shiddiq, amanah and fathonah through the literacy material of Islamic fairy tales.

From the results of the delivery of the fairy tale material, the research team made observations. Observation or direct observation is the activity of collecting data on the environmental conditions of the research object that supports research activities, so as to get a clear picture of the condition of the

research. Then to find out clearly about the application of the fairy tale-based learning model in the formation of Islamic character in grade 3 students of SDIT Aulady BSD.



Picture 5. Mind map from a student in a grade 3 SDIT Aulady BSD

4. Listening to Islamic tales from professional storytellers, about good manners.

As the highlight of the theme of Islamic Fairy Tale Literacy and regularly every year SDIT Aulady BSD always organizes Language Week activities in commemoration of the Youth Pledge of the Republic of Indonesia. So on November 8-12 2021 SDIT Aulady BSD invited a professional storyteller, namely Kak Muis, with the theme of a fairy tale that is polite in speaking and has a commendable personality.



Picture 6. Listening to Islamic Tales about Polite Manners

As stipulated in the 2013 curriculum policy, the learning process in elementary schools must use an integrated thematic learning system, SDIT Aulady BSD as an integrated Islamic school in the South Tangerang area also has non-thematic subjects as part of achieving the vision and mission of SDIT Aulady BSD School of Excellence, namely:

1. Trustworthy, honest and responsible in all actions
2. Be tenacious and work hard in achieving your goals
3. Gentle and polite in speech and behavior
4. Praiseworthy morals in words and deeds
5. Discipline and orderly carry out all school rules
6. Believe in Allah and always be kind to others.

SDIT Aulady BSD has non-thematic subjects, namely Literacy subjects. This subject is a special subject that is held once a week, for 2 hours of lessons. This subject is expected to improve the literacy skills of elementary school-aged children, which were originally defined as reading and writing skills, but at this time their understanding has developed. In the realm of learning, literacy is an important ability that must be possessed by every student to master various subjects. In line with the explanation in the 2013 Curriculum that language is the driver of knowledge, Indonesian is a means of conveying knowledge. In other words, children's language skills, especially reading and writing, which are obtained through Indonesian language lessons, will determine their success in mastering various other subjects.

In Islamic literacy subjects at SDIT Aulady BSD, the notion of literacy is focused on information skills. Information capability refers to several activities, namely gathering information, processing

information, and communicating information. These three activities cannot be separated from reading and writing skills, which are carried out by teachers and students in the learning process in class. This kind of activity is in accordance with the demands of the learning process according to the 2013 Curriculum, which is known as the scientific approach. In relation to the implementation of literacy learning, the teacher must pay attention to four aspects, namely learning resources, teaching materials, learning strategies, and assessment.

The field of study which is still relatively new has experienced rapid development so that it is hoped that it can overcome various future educational challenges.

Findings Description in cycle 1

Based on observations, the learning process carried out, students became active and had readiness in accepting the material given by the lecturer, this was seen when the lecturer delivered the material after the discussion process they conveyed, students became more active in asking and providing comments, because students already had readiness to receive the material. The learning process is two-way. This is because students are not only ready to learn, but are able to increase normal awareness of learning.

However, in the implementation of this learning, not all students are able to be actively involved in the learning process. Some students are still passive participants who only listen and receive material. As can be seen from the following observation table:

Table 1. Observation results

No	Students' Intial	Observation results before cycle 1			Observation Results after cycle 1		
		Active	Mode rate	Passiv e	Act ive	Mod erate	Pas sive
Group 1 (Class 3 Umar bin Khatab)							
1.	ABR	√			√		
2.	BRY					√	
3.	RH			√		√	
4.	PYT			√			√
5.	THA	√			√		
6.	YTR			√			√
7.	YIR		√			√	
8.	TAH	√			√		
Group 2 (Class 3 Salman Al Farisi)							
15.	NAH		√			√	
16.	BHY			√			√
17.	UIT		√			√	
18.	OKY			√			√
19.	HYT			√			√
20.	POA			√		√	
21.	YRT	√			√		
Group 3 (Class 3 Mushab bin Umair)							
22.	UYT			√		√	
23.	ATR			√			√
24.	UJH		√			√	
25.	IUT	√			√		
26.	MHT		√			√	

27. MIT		√		√		
Total	5	6	9	6	20	6
Percentage	20,5	33,3	46,1	25,6		33,3
	1	4	5	4	33,3	4 %
	%	%	%	%	%	

From the table above, it can be seen that from 27 students after the first cycle there was an increase in learning readiness. Before the implementation of learning in the first cycle 20.51% of students were active and after the first cycle there was an increase of 5.13% to 25.64%

Findings in cycle 1

For example, the cerebral cortex or also known as the cerebrum has lobes that are associated with the functions of thinking, counting, memory, and language. While in the cerebral cortex there is a limbic system associated with the function of emotion regulation and emotional memory. So that it is expected to maximize the function of the neocortical brain, especially in character development.

In learning Islamic fairy tale literacy with the Neuroscience method, the results obtained are that:

1. Students are interested in the three methods, because they are student centered.
2. The method that according to grade 3 students is the most interesting is the method of making mind maps
3. These three methods are carried out in stages over a period of 3 weeks, so that in the end students understand Islamic fairy tale literacy with examples not only through lectures from the teacher.
4. Grade 3 students of SDIT Aulady can concentrate well in these 3 methods and it can be said that the learning brain function or neocortex can function optimally and also achieve the goal of having good manners to teachers, friends and parents.

Discussion

From the results of the delivery of the Islamic fairy tale material, the research team made observations. Observation or direct observation is the activity of collecting data on the environmental conditions of the research object that supports research activities, so as to get a clear picture of the condition of the research. Then to find out clearly about the application of the fairy tale-based learning model in the formation of Islamic character in grade 3 students of SDIT Aulady BSD.

In addition, the research team also conducted interviews. An interview is a conversation with a specific purpose carried out by two parties, namely the interviewer (interviewer) and the interviewee (interviewee) with the researcher asking what was planned previously to the respondent.

Interviews in this study were conducted for teachers in the field of literacy studies, and to obtain data and collect information about:

- 1) The way the teacher applies moral education to students
- 2) Selection of an Islamic fairy tale method that is suitable for applying Islamic characters to students
- 3) Teacher preparation to carry out the application of Islamic character in the classroom or outside the classroom
- 4) Positive changes that occur in children within the scope of Islamic character at school or in the surrounding environment.

From the results of the interview, it was found that:

Islamic character in grade 3 students of SDIT Aulady BSD

Character is the behavior of a person who is driven by a conscious desire to do a good deed so that Islamic character can be understood as behavior that is in accordance with Islamic values.

In grade 3 SDIT Aulady BSD, Islamic characters are adapted to the conditions or environment of students, namely at an early age. Among the application of these Islamic values are as follows:

Be polite to teachers and friends

At school, most of the interactions that occur in grade 3 SDIT Aulady BSD students are interactions with others. This interaction occurs in the learning process in the classroom remotely through zoom meetings as well as during KBM activities carried out by PTMT.

In grade 3 SDIT Aulady BSD Islamic character to friends is applied according to moral obligations. Students' morals cannot be equated with one or another. So the morals that are emphasized are basic morals. Among these basic morals are the attitude of helping each other, not disturbing or mocking each other, speaking politely, being friendly to others.

"Through the media of Islamic fairy tales in literacy lessons. While interacting with each other via zoom meeting, the children interacted in their own way and in a language that was easy to understand for each other. So it is natural that there are several languages that sometimes only their fellows understand. However, the literacy teacher is to emphasize that this interaction is in accordance with Islamic character, including helping each other, not disturbing or mocking each other, speaking politely, being friendly to others," said Mrs. Suryani (Teacher of class 3 Mushab).

Hopefully, in the future, literacy learning at SDIT Aulady can get better and have raw materials so that it can be taught from year to year on an ongoing basis.

4. CONCLUSION

1. The main purpose of educational neuroscience is to review educational concepts and practices from the perspective of the human brain working system, this is in accordance with the results of studies that have been conducted, found some evidence that there is an integrated human brain system that regulates human cognition, affect, and psychomotor.
2. Learning with neuroscience methods, especially in Islamic tale literacy lessons can enhance the function of the learning brain or neocortex of students, where students can concentrate well when students maximize their learning methods through visual observations, movements and fun media, such as virtual discussion, mind map and live Islamic storytelling from a professional story teller.
3. The third grader students as the objects of this research also develop their manner through these exemplary manners, such as trustworthy, honest and responsible in all actions, be tenacious and work hard in achieving your goals, gentle and polite in speech and behavior, praiseworthy morals in words and deeds, discipline and orderly carry out all school rules, believe in Allah and always be kind to others.

REFERENCES

- Arikunto, S. (2006). *Prosedur Penelitian Suatu Pendekatan Praktik*. Jakarta: Rineka Cipta.
- Bungin, B. (2003). *Analisis Data Penelitian Kualitatif*. Jakarta: PT. Raja Grafindo Persada.
- Dewi, N. R. (2013). Peningkatan Kemampuan Koneksi Matematis Mahasiswa Melalui Brain-Based Learning Berbantuan Web. *Makalah Pendamping: Pendidikan Matematika*, 4(1), 283-374. <https://doi.org/10.15294/kreano.v9i2.16883>
- Fitri, R. (2017). Metakognitif pada Proses Belajar Anak dalam Kajian Neurosains. *Jurnal Pendidikan (Teori dan Praktik)*, 2(1), 56-64.
- Hidayat, B. (2017). Pembelajaran Al-Quran pada Anak Usia Dini Menurut Psikologi Agama dan Neurosains. Paper presented at the The 2nd Annual Conference on Islamic Early Childhood Education, Yogyakarta.
- Johnson, M. H., & Haan, M. d. (2015). *Developmental Cognitive Neuroscience: An Introduction*. UK: Blackwell.
- Kern, R. 2000. *Literacy and Language Teaching*. Oxford: Oxford University Press.
- Khiyarusoleh, U. (2016). Konsep Dasar Perkembangan Kognitif pada Anak Menurut Jean Piaget. *DIALEKTIKA: Jurnal Pemikiran dan Penelitian Pendidikan Dasar*, 5(1), 1-10.

- Latifah, R. A., & Mahmudi, A. (2018). Pengaruh Pembelajaran Matematika dengan Pendekatan Brain Based Learning terhadap Kemampuan Penalaran Matematis Siswa SMP pada Materi Teorema Pythagoras. *Jurnal Pendidikan Matematika-S1*, 7(2), 58-66. <http://eprints.uny.ac.id/id/eprint/56500>
- Lestari, K. E. (2014). Implementasi BrainBased Learning untuk meningkatkan kemampuan koneksi dan kemampuan berpikir kritis serta motivasi belajar siswa SMP. *JUDIKA (Jurnal Pendidikan UNSIKA)*, 2(1), 36-46. <http://matematika.upi.edu/>
- MacLean, Paul D. (1998). "Paul D. MacLean". In Squire, Larry R. (ed.). *The history of neuroscience in autobiography*. Vol. 2. Bethesda, Md: Society for Neuroscience (published 1996). pp. 242–275. ISBN 978-0-12-660302-6. OCLC 36433905.
- Musfiroh, Tadkirotun. Konstruksi Kompetensi Literasi untuk Siswa Sekolah Dasar. *Jurnal LITERA*, Volume 15, Nomor 1, April 2016
- Nurasiah, N. (2016). Urgensi Neuroscience Dalam Pendidikan (Sebagai Langkah Inovasi Pembelajaran). *ALTadzkiyyah*, 7(2), 72-93. <https://www.tadkirotun.id/konstruksi-kompetensi-literasi-untuk-siswa-sd-jurnal-litera/>
- Sukardi. (2003). *Metodologi Penelitian Pendidikan: Kompetensi dan Praktiknya* Jakarta: PT. Bumi Aksara.
- Wathon, A. (2016). Neurosains Dalam Pendidikan. *Jurnal Lentera: Kajian Keagamaan, Keilmuan dan Teknologi*, 1(2), 284-294.

