NEUROSCIENCE IN ARABIC LANGUAGE LEARNING PRACTICES: BUILDING RELATIONSHIPS BETWEEN COGNITIVE PROCESSES AND LANGUAGE ABILITY THROUGH INNOVATIVE LEARNING MEDIA

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ABSTRAK

Pembelajaran bahasa Arab telah menjadi subjek minat yang berkembang dalam kajian neurosains kognitif. Studi ini bertujuan untuk mengeksplorasi bagaimana konsep neurosains dapat diintegrasikan ke dalam praktik pengajaran bahasa Arab untuk memperkuat hubungan antara proses kognitif dan kemampuan berbahasa. Dengan menggabungkan pengetahuan tentang aktivitas otak dalam pembelajaran bahasa dengan pendekatan pedagogis yang inovatif, pendekatan ini bertujuan untuk meningkatkan efisiensi pembelajaran serta memperkuat retensi dan pemahaman siswa terhadap bahasa Arab. Studi ini melibatkan pengamatan langsung terhadap proses pembelajaran bahasa Arab di lingkungan pendidikan formal, dengan memperhatikan respons kognitif siswa terhadap berbagai strategi pengajaran yang diterapkan. Selain itu, penelitian ini juga melibatkan analisis neurosains untuk memahami aktivitas otak yang terjadi saat proses pembelajaran bahasa Arab, seperti pemrosesan bahasa, pemahaman gramatikal, dan penerapan kosakata Hasil penelitian menunjukkan bahwa penggunaan pendekatan neurosains dalam praktik pembelajaran bahasa Arab dapat menghasilkan peningkatan yang signifikan dalam kemampuan siswa untuk memahami dan menggunakan bahasa tersebut. Dengan membangun hubungan yang lebih kuat antara proses kognitif dan kemampuan berbahasa, pendekatan ini membuka pintu bagi pengembangan metode pembelajaran yang lebih efektif dan adaptif di lingkungan pendidikan bahasa Arab.

Kata kunci: neurosains,bahasa Arab, kognitif, kemampuan berbahasa

ABSTRACT

Arabic language learning has become a subject of growing interest in cognitive neuroscience studies. This study aims to explore how neuroscientific concepts can be integrated into Arabic language teaching practices to strengthen the relationship between cognitive processes and language abilities. By combining knowledge about brain activity in language learning with an innovative pedagogical approach, this approach aims to increase learning efficiency and strengthen students' retention and understanding of the Arabic language. This

study involves direct observation of the Arabic language learning process in a formal education environment, by paying attention to students' cognitive responses to the various teaching strategies implemented. In addition, this research also involves neuroscientific analysis to understand brain activity that occurs during the Arabic language learning process, such as language processing, grammatical understanding, and vocabulary application. The results of the research show that the use of a neuroscientific approach in Arabic language learning practice can produce significant improvements in ability. students to understand and use the language. By establishing a stronger connection between cognitive processes and language skills, this approach opens the door to the development of more effective and adaptive learning methods in Arabic language education environments.
***Keywords**: neuroscience, Arabic language, cognitive, language skills*

INTRODUCTION

Arabic language learning in Indonesia still faces a number of challenges that need to be overcome. Both teachers and students often face various difficulties that affect the effectiveness of learning (Ritonga, 2023). The main challenges faced by Indonesian students in learning Arabic can be divided into three parts. First, linguistic challenges relate to the differences in characteristics of Indonesian and Arabic, including phonology, morphology, syntax, semantics and writing systems. This difference can make it difficult for students to understand and master Arabic (Kamsir, 2020). Second, methodological challenges are related to the techniques and learning steps used. Lack of accuracy in choosing learning methods, strategies and materials can hinder the achievement of learning objectives. Third, sociological challenges related to Arabic language teaching policies and the lack of an environment that supports learning this language (Syamsuddin, 2010). Educational policies and curricula that are not yet optimal as well as the lack of a social environment that facilitates the use of Arabic in everyday life are also obstacles to learning. .

Overcoming these challenges requires serious attention from the government, educational institutions, teachers and society as a whole to improve the quality of Arabic language learning in Indonesia. Arabic itself is a rich and complex language, with a long history and broad influence throughout the world (M. N. Annisa & Safii, 2023). Learning Arabic can open the door to a variety of

opportunities, both personally and professionally. However, learning Arabic can also be a challenging task, especially for native speakers of other languages. Neuroscience offers new insights into how the human brain learns and processes language (Maryam Nur Annisa, 2023). Neuroscientific research has identified areas of the brain involved in language learning, as well as the cognitive processes that underlie them. A better understanding of this process can help us develop more effective language learning methods.

A number of studies have been conducted to examine the relationship between cognitive processes and language abilities (Utami & Nurjati, 2017). This research has shown that a variety of cognitive processes are involved in language learning, including memory, attention, and reasoning. Neuroscientific research has also identified areas of the brain involved in language learning. These areas include Broca's cortex, which is involved in language production, and Wernicke's cortex, which is involved in language comprehension. The influence of advances in information technology on Arabic language learning is very significant, especially in terms of developing learning methods that are more effective and attractive for students. One interesting research is the work of (Sitohang, 2019) which tries to integrate neurolinguistic programming and information literacy in students' speech learning. The results show that this method can help students increase self-confidence, motivation and achieve learning goals. Other research, such as that conducted by (Hilmi, 2017) also highlights the importance of a neurolinguistic approach in learning Arabic, especially in understanding quwa'id as-sharfiiyah (morphological rules) better. This can provide a deeper understanding of the structure of the Arabic language and facilitate the learning process, especially in the context of grammatical learning. Integration between information technology, neurolinguistics and traditional learning methods can be an effective solution to increase students' interest and understanding of Arabic. Thus, developing a learning approach that combines various methods can provide better results in improving the quality of Arabic language learning in madrasas (Jailani et al., 2021).

One of the dominant approaches in learning Arabic is an imbalance in optimizing the use of the right and left brain. The problems that arise due to this

imbalance are very serious in developing the natural potential of learning Arabic (Harwintha Yuhria Anjarningsih, 2010). To overcome this, it is necessary to optimize the overall role of the right and left brain so that it can help understand the implications of learning Arabic by accessing the language memory store. Arabic language curriculum development must be based on empirical facts that reflect values based on Arabic language learning studies. In this context, a needs analysis is needed to establish brain-based learning as a philosophical basis for developing a neuroscience-based curriculum (Fauzi, 2020) By placing brain anatomy and function in an educational context, there will be a significant contribution to the transfer of knowledge in learning, because brain anatomy provides rational, emotional and spiritual aspects (Suyadi 2020). Through this article, the basis for neuroscience studies in education and curriculum development. Arabic proves that knowledge transfer performance is influenced by right and left brain function. However, in practice, Arabic language curriculum development still tends towards instrumental knowledge which is dominant in the use of the left brain (Fauzi, 2020).

This research can be considered different and still new because it brings an approach that has not been widely explored in the context of Arabic language learning. The novelty of this research lies in the use of neuroscience-based Arabic language learning media, which pays attention to students' brain conditions to increase learning effectiveness. One of the unique things about this research is the alternative offering in the form of Arabic language learning media that is exciting, fun and captivates students in the learning process. The use of neuroscience-based media such as learning videos, songs on mufradat, games for kitabah and qiroah skills, provides a more interesting and effective learning experience. This is different from previous research which may focus more on conventional teaching techniques. The approach proposed by this research shows awareness of the importance of right and left brain responses in the learning process, which can increase students' motivation and understanding of Arabic. Thus, this research provides a new contribution in the development of learning methods that are more innovative and appropriate to students' current brain conditions.

This research aims to analyze the use of Arabic language learning media from a neuroscience perspective. Researchers provide an alternative approach to learning Arabic using neuroscience-based learning media. The main aim is to overcome learning difficulties experienced by students in understanding Arabic. This approach is adapted to students' preferences and learning styles, by utilizing both sides of the brain (right brain and left brain) and focusing on easier and more enjoyable learning (Suyadi 2020). This alternative learning method places great emphasis on the use of learning media, which integrates material. learning with neuroscientific principles (called Neuro-media). This approach has received widespread attention among researchers and academics, especially in the fields of scientific research and education. This research is based on the argument that many students have difficulty understanding Arabic, and a neuroscience approach in learning media can be an effective solution to increase students' understanding and interest in learning (Jailani, 2023).

This research aims to explore and prove the role of the brain in developing the Arabic language curriculum using a neuroscience approach, which is of great interest in implementing the Arabic language learning process. The research method used is library research with a content analysis approach. This research uses primary data sources in the form of books and scientific journal articles related to the study theme, especially scientific journal articles written by Muhammad Yusuf about the use of the right brain in developing the Arabic language curriculum.

The assumptions of this research come from Muhammad Yusuf's writings about the role of the right brain in developing the Arabic language learning curriculum to respond to dehumanization factors. This paradigm proposes a synthesis carried out by experts to optimize methods and strategies in learning Arabic. A comprehensive analysis is needed to answer academic needs in the modern era (Yusuf, 2019). The author emphasizes that in the 24th century, the importance of the functional use of the left brain cannot be ignored as a rationale in developing the Arabic language learning curriculum. The function of the left brain helps analyze the needs of the learning curriculum and complements the function of the right brain in applying the curriculum. Both work synergistically

through the nervous system (neuroscience) to optimize knowledge into integral knowledge. In this study, the author proposes the concept of utilizing neuroscience which involves right and left brain function in designing an optimal Arabic language curriculum. This shows the importance of understanding and utilizing the potential of the brain as a whole in the context of learning Arabic (Idrus, 2023).

Researchers use library research methods, which involve collecting data from various sources relevant to the research object, such as books, scientific works, and journals (Nashihin, 2023). The approach used is qualitative, where data is obtained through literature study by carefully reviewing articles, books and scientific journals related to neuroscience-based Arabic language learning. Data is collected by tracing and collecting information from various sources which serve as research references. . After the data is collected, discussions are carried out on all the problems studied to produce accurate and precise data and study materials. The data that has been collected is then analyzed qualitatively with an approach from general to specific (Dahuri, 2023). This research also uses various methods, including literature reviews, experiments, and neuroimaging. A literature review will be used to gather information about existing research on the relationship between cognitive processes and Arabic language skills. Experiments will be used to examine how certain cognitive processes are involved in Arabic language learning. Neuroimaging will be used to study brain activity during Arabic language learning.

DISCUSSION

1. Development of Arabic Language Learning Curriculum

The curriculum concept applied in academic circles tends to prioritize the curriculum as an academic subject, with the main focus on science in the entire educational process. This view emphasizes the dominance of science in educational activities rather than considering the interests of teachers and students in more depth. This emphasis on science is in line with the view of Burhan Yusuf Habibi who considers that science is oriented towards

communication and global insight, so that the curriculum as an academic subject becomes the center of attention in the learning system (Yusuf, 2019).

Apart from that, in the 2013 curriculum, there was development and refinement from a teacher-centered approach to a learner-centered one (Istiqomah, 2021). Learner-centered learning is directed at increasing multidimensional understanding of science by considering students' learning styles. Furthermore, curricula that pay more attention to the role of teachers and students as objects tend to view science as a source of truth that helps develop intellectual power (Rahmah, Johar & Latifah, 2021). Perennialist and essentialist curriculum organizations aim to develop children's intellectual powers to achieve universal truths and instill discipline from sources of truth, such as global religious values.

Apart from that, Arabic not only functions as a tool to preserve the teachings and values of the Islamic religion, but also to develop students' intelligence and creativity through psychological aspects and the development of productive energy (Pink, 2019). The centralization of Arabic in the curriculum helps maintain communication in a social context and builds communication intelligence in science and religion. The basic principle in designing an Arabic curriculum places four language skills as the main focus, with the integration of core elements such as learning objectives, teaching materials, learning methods, learning activities, learning media, and learning assessment (Asrori, 2013). The curriculum developed through these basic principles seeks integration between nation, brain-based learning, and character building to develop optimal management in uniting relevance, synchronization, and efficiency in the development of the Arabic language curriculum. This effort also seeks to reconstruct the objectives and direction of Arabic language learning orientation studies in order to overcome divisions in aspects of proficiency and knowledge, and find connectivity that brings changes in strategies and principles for developing the Arabic language curriculum.

2. Neurolinguistic Approach in Learning Arabic

Neuroscience is a science that studies the relationship between the brain and mind, or what is often referred to as the relationship between soul and

body. The focus of scientific study of neuroscience is on the functions and nervous systems in the brain, which develop and develop understanding of the anatomy of the human body. Neuroscience is fundamentally concerned with brain neuro-anatomy (brain structure) and brain neurophysiology (brain parts and functions), which play an important role in the moral and rational transfer of knowledge. The science contained in neuroscience is integrated into brain performance through cognitive interpretation, which then produces new meaning in science through active micro and macro cells.

In a broader context, neuroscience has an important goal in studying the human brain. First, neuroscience aims to provide an explanation or explanation of how the nervous system can function throughout life, including regulating responses to stimuli through the sensory system, managing working memory, as well as explaining phenomena such as will and intention (Suyadi & Zalik, Nuryana & Niki, Alma & Febriana, 2020). Second, neuroscience also aims to control knowledge about the human brain to develop efforts to prevent and treat diseases related to the nervous system.

Neurolinguistics, a branch of neuroscience that studies the human brain, brain function, and parts related to language, discusses the concept of connectivity between the brain and the mind. Research shows that students who receive positive influences, especially from religious activities such as tadarus al-Qur'an, have a good response to these influences (Suyadi, 2020).

The application of neurolinguistics in Arabic language learning in madrasa schools shows a positive reflection on brain neuro-anatomy (brain structure) and brain neurophysiology (brain parts and their functions), which facilitates the transfer of knowledge in an attitudinal and rational manner (Fauzi, 2020). The neurolinguistic approach in learning Arabic includes aspects of multiple intelligence, emotional intelligence, spiritual intelligence, adversity quotient, brain-based learning, and instrumentation.

The results of research on the development of neuroscience and linguistics in Arabic language learning at MA Itmamunnajah show that this approach can produce the development of holistic personality attitudes, involving students' thoughts, emotions and feelings. Cutting-edge technologies

such as PET, SPECT, and FMRI are used to carefully study how students' brains work (Jailani et al., 2021). By considering the basis of educators' activities in learning Arabic, it can be concluded that the brain's nervous system has a dominant role in actualizing the framework of thinking and capturing information in the context of language activation. This shows that the role of neurolinguistics in Arabic language learning design continues to grow.

According to the literature review presented, the role of an educator or teacher is very important in the learning process to develop students' brain abilities. Neurolinguistics, as a combination of the role of the brain related to aspects of language in individuals, is a study that focuses on the role of the brain in language activities in general (Jailani et al., 2021).

In neurolinguistic studies, it was found that students respond to information by involving the left brain in processing information and storing it in the right brain. This underlines the importance of optimizing the level of human language, which is influenced by the quality and quantity of human nerves in transferring and processing information (Suyadi, 2020). It is known that the human brain is divided into the left brain and the right brain, where the left brain is known as the language and mathematics brain, while the right brain is the art and color brain. Both have tendencies in different directions, so learning Arabic needs to pay attention to the connection and interaction between the right brain and the left brain. Learning Arabic is closely related to the activity and function of the two hemispheres of the brain .(Jailani et al., 2021)

Overall, the research that has been conducted proves that parts of the brain have their own functions and tasks, which strengthens the understanding that learning Arabic requires special attention to the interaction and synchronization between the right brain and the left brain.

3. Use of innovative Arabic learning media from a neuroscience perspective in improving students' cognitive and language skills

In the world of science, the human brain has a very significant role in controlling all activities (Hilmi 2020). The brain, which weighs around 1.5 kg, has around 100 billion active nerve cells which are responsible for processes

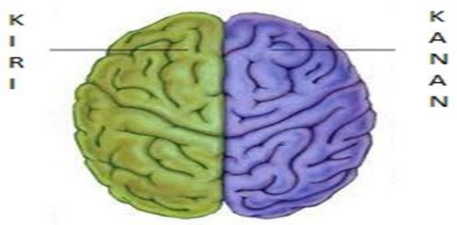
such as thinking and feeling. , see, speak, and create. Neurons, which are the smallest units in the brain, play an important role in transferring signals through electrical action.

According to the latest research conducted by one of the neuroscience experts in Islamic education, Suyadi (2022), neuroscience makes a significant contribution to teaching by combining approaches, models and concepts in learning. This is true not only in general teaching and Islamic education, but also in the teaching of Arabic, which has been tested by many scholars. Neuroscience plays a role in enriching the learning process and student-oriented approach, especially in the use of Arabic learning media which is supported by students' brain responses, which helps increase effectiveness and interest in learning (Suyadi & Nuryana, Z Sutrisno, 2022).

The results of research at SMK Muhammadiyah 3 Yogyakarta also confirm the contribution of neuroscience in education, especially in the context of learning Arabic. This research focuses more attention on students using neuroscience-based learning media, especially in facilitating understanding of vocabulary material which is often considered difficult and boring. Through this learning media, students can learn according to their brain development, thus creating a more interesting and effective learning experience (Jailani, 2023).

Figure 1.

Left and Right Brain



Based on Figure 1 above, right brain and left brain derivatives can be seen as important aspects in neuroscience and learning. Currently, more and more scientists are researching the brain as a point of view in the learning process. This is because for a long time, many Muslim scientists have studied science and religion in detail, where these two sciences are interrelated in the

context of Islamic education and Arabic. Language cannot be separated from language skills (Minarti, 2022).

Suyadi et al., (2022) said that one of the edutainment-based learning theories is the triple brain theory, proposed by Paul Maclean. This theory divides the human brain into three parts: the reptilian brain, the mammalian brain, and the neocortical brain. The reptilian brain functions to respond to threats by fighting or running, as well as controlling fear or other discomfort (Suyadi & Nuryana, Z Sutrisno, 2022). The mammalian brain, also known as the limbic system, controls emotions and stores memories, including emotionally strong memories . The neocortex brain, also known as the thinking brain, is responsible for thinking, remembering, making decisions, and enjoying art.

All aspects of language, perception and reasoning depend on the brain, so the brain is the basis of all human potential. Therefore, effective learning is one that suits the way the human brain works. Anatomically, the brain is divided into four main parts: the cerebrum, the cerebellum, the brain stem, and the limbic system. Paul McLean's theory is the basis for analyzing the data in this research (Suyadi., 2017).

According to Fritz et al. (2021), the latest research in neuroscience shows a very close connection between the brain and human behavior or character. Through the use of Positron Emission Tomography (PET), it has been revealed that there are six brain systems that work together to regulate human behavior, namely the prefrontal cortex, limbic system, Cingulatus Gyrus, basal ganglia, temporal lobe, and cerebellum (Fritz, I., & Baggio, 2021).

In research conducted by Jailani et al. (2022), it was found that the use of neuroscience in learning directs students to be trained with an approach to the right brain, left brain and midbrain. This aims to make research more specific and focused. Along with the rapid development of learning media, neuroscience-based Arabic learning media is also starting to emerge (Jailani et al., 2021). According to (Suyadi & Zalik, Nuryana & Niki, Alma & Febriana, 2020) neuroscience plays a role as a facilitator in connecting students' interest in learning Arabic. Focused thinking and student happiness can affect the

brain, especially the prefrontal cortex which is responsible for information growth and brain optimization.

Thus, the use of Arabic learning media combined with neuroscience is closely related to students. Learning media that attracts students' attention and is adapted to the characteristics of their brains will be more effective (Mutholib, A., & Setiawan, 2021). The media is expected to be able to convey lesson material in an interesting way, for example through the use of muhadasah (conversation) and mufrodat (vocabulary). These materials are a core part of learning Arabic and its basic competencies. Educators can deliver this material by utilizing reading, writing, listening and especially speaking skills to students. In the innovation context of the 4.0 revolution era, learning Arabic can be an important part in preparing students for an increasingly modern future (Mutholib, A., & Setiawan, 2021).

Based on research conducted by Aziz et al. (2022), innovative learning media in Arabic language learning are all forms of tools used to convey learning material, both in formal and non-formal education contexts. The function of this learning media for students in class includes fixative, distributive, sociocultural and psychological aspects. This aims to make it easier for educators to deliver material and increase students' enthusiasm for learning in the Arabic language learning process (Aziz & Padil & Mujtahid & Prihadi, 2022).

In the context of learning Arabic in Indonesia, there are several obstacles identified by Yunita et al. (2020), including the use of monotonous learning methods such as translated grammar, as well as the implementation of Arabic language learning which is not yet optimal. The translated grammar method tends to be used because it is easier to implement, but this can reduce students' interest in learning (Yunita & Pebrian, 2020).

In another study, Suyadi (2020) stated that basically there is no dualism or trichotomy, but rather works simultaneously and unitedly. For example, activities using left or right body organs will influence opposite brain activity (Suyadi & Zalik, Nuryana & Niki, Alma & Febriana, 2020). Thus, neurolinguistic-based learning media can facilitate Arabic language learning by

considering brain function as a whole and Simultaneously, not only by utilizing innovative learning media based on neuroscientific principles, students can experience a more effective and enjoyable learning process. For example, using virtual simulations to strengthen vocabulary understanding, gamification-based games to increase learning motivation, or using visualization techniques that can stimulate students' imagination and memory.

Apart from that, neuroscience also helps in understanding how the learning and language processes occur in the human brain. For example, understanding how the brain recognizes and processes Arabic language information, as well as how this process affects students' ability to communicate and use Arabic fluently and correctly (Ulya, 2024). Thus, the use of neuroscience in Arabic language learning practices through innovative learning media is an important step in building a harmonious relationship between cognitive processes and students' language abilities (Sulwan, 2023). This is expected to increase the effectiveness and efficiency of learning Arabic in various educational environments that focus on the right brain or left brain only

CONCLUSION

Neuroscience offers new insights into how the human brain learns and processes language. A better understanding of this process can help us develop more effective Arabic language learning methods. The use of neuroscience in Arabic language learning practices through innovative learning media plays a crucial role in building a harmonious relationship between cognitive processes and students' language abilities. By understanding how the human brain learns, recognizes, and processes Arabic information, learning can be adjusted to increase learning effectiveness and student interest in learning. Neuroscientific principles help to enrich the learning process, from considering students' learning styles to optimizing the use of learning media that stimulates various student brain functions. Thus, the use of neuroscience in Arabic language education makes a significant contribution in providing a more enjoyable learning experience.

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