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Reconstruction of Arabic Vocabulary Learning Methods Based on Neuroscience/Rekonstruksi Metode Pembelajaran Kosakata Bahasa Arab Berbasis Neurosains

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Abstract: This study explores the reconstruction of Arabic vocabulary (mufradat) teaching methods through a neuroscience-based approach. The research aims to formulate a more effective method of teaching vocabulary by utilising principles of brain function, particularly in enhancing students' absorption and retention of vocabulary. The method used is qualitative library research with a descriptive-analytical approach, which involves reviewing literature related to Arabic language learning, neuroscience theories, and vocabulary teaching practices. The findings of the study indicate that the application of neuroscience principles, such as emotional engagement, multisensory input, and meaningful repetition can improve the effectiveness of vocabulary learning. This study concludes that reconstructing vocabulary teaching methods based on neuroscience can create a more enjoyable, interactive learning process that aligns with how the brain works, thus accelerating and strengthening students' mastery of Arabic vocabulary.

Abstrak: Penelitian ini mengangkat tema rekonstruksi metode pembelajaran mufradat (kosakata) bahasa Arab dengan pendekatan berbasis neurosains. Tujuan penelitian ini adalah untuk merumuskan metode pembelajaran mufradat yang lebih efektif dengan memanfaatkan prinsip-prinsip kerja otak, khususnya dalam meningkatkan daya serap dan retensi kosakata pada peserta didik. Metode yang digunakan adalah penelitian kualitatif kepustakaan (library research) dengan pendekatan deskriptif-analitis, yaitu dengan mengkaji literatur-literatur terkait pembelajaran bahasa Arab, teori neurosains, serta praktik pembelajaran kosakata. Hasil penelitian menunjukkan bahwa penerapan prinsip neurosains, seperti keterlibatan emosi, multisensori, dan pengulangan bermakna dapat meningkatkan efektivitas pembelajaran mufradat. Kesimpulan dari penelitian ini adalah bahwa rekonstruksi metode pembelajaran mufradat berbasis neurosains mampu menciptakan proses pembelajaran yang lebih menyenangkan, interaktif, dan sesuai dengan cara kerja otak, sehingga dapat mempercepat dan memperkuat penguasaan kosakata bahasa Arab oleh peserta didik.

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Introduction

Arabic language instruction in various Islamic educational institutions, particularly in the aspect of vocabulary acquisition (*mufradat*), still faces significant challenges. Among these are students' low absorption of new vocabulary, lack of learning motivation, and monotonous teaching methods that do not fully activate the brain's potential. In fact, vocabulary serves as the foundational element for mastering other language skills such as listening, speaking, reading, and writing.[1] These challenges are further compounded by the limited variety of methodological approaches, which are often not tailored to students' learning styles or the brain's mechanisms for processing information. This issue is exacerbated by the dominance of conventional methods that lack contextual relevance and fail to integrate both affective and cognitive dimensions holistically.[2]

A neuroscience-based approach has become increasingly important to apply in language instruction. Neuroscience is the study of the brain's structure and function, as well as how the brain works in the learning process. Through this understanding, educators can design more effective teaching methods that align with how the brain absorbs and processes information. This approach also contributes to creating a more human-centred, enjoyable, and learner-oriented educational experience[3]. By integrating neuroscience, psychology, and education, learning can be designed to support cognitive, affective, and social development in a balanced manner. For example, activating the hippocampus in forming long-term memory or the role of the amygdala in managing emotions during learning can serve as a foundation for crafting vocabulary teaching strategies that are emotionally impactful, contextual, and meaningful.[4]

Reconstructing vocabulary learning methods based on neuroscience is not merely

[1] Abdul Azis and Suyadi Suyadi, "Arabic Learning Media Based on Neuroscience," *Insyirah: Jurnal Ilmu Bahasa Arab dan Studi Islam* 6, no. 1 (2023): 34–44; Dewi Nazilatul Maghfirah, Taufik, and Aliwafa, "Menjadikan Pembelajaran Mufradat Menyenangkan : Strategi Inovatif Untuk Meningkatkan Motivasi Belajar Bahasa Arab di MI," *Al-Madrasah: Jurnal Ilmiah Pendidikan Madrasah Ibtidaiyah* 8, no. 4 (2024): 1842–1853.

[2] Nada Nabilah Syafiqoh et al., "Developing a Neurosains-Based Arabic Curriculum," *Al Mi'yar: Jurnal Ilmiah Pembelajaran Bahasa Arab dan Kebahasaaraban* 6, no. 1 (2023): 139.

[3] Lalu Abdurrahman Wahid, "Pengembangan Pembelajaran Pendidikan Agama Islam Berbasis Pengembangan Potensi Otak Menggunakan Teori Neurosciences," *Tarbiyatuna: Jurnal Pendidikan Islam* 15 (2022): 54–70.

[4] Anang Fathoni, Bayu Prasodjo, and Mazda Leva Okta Safitri, *Teori Dan Psikologi Belajar Anak: Neurosains, Behaviorisme, Kognitif Sosial, Konstruktivisme, Motivasi, Dan Kecerdasan Ganda* (Purbalingga: Eureka Media Aksara, 2025); Mardiah Mardiah, Syaifuddin Sabda, and Ani Cahyadi, "Analisis Relevansi Neurosains Dengan Pembelajaran Dan Kesehatan Spiritual," *Journal on Education* 04, no. 04 (2022): 1489–1510.

a technical innovation; it represents a paradigm shift from an instructional approach to a biological-psychological one. By understanding how the brain absorbs and retains information, educators can select appropriate media, strategies, and forms of assessment to make learning more enjoyable, relevant, and memorable for students. This approach also emphasises the importance of affective and social aspects in language learning, which are deeply influenced by emotions and meaningful learning experiences[5]. Furthermore, this integration enables the simultaneous enhancement of affective and cognitive aspects, which have often been treated separately in language education practice.

Several studies are relevant to this research. For instance, Fauzi's study discusses the application of neuroscience in developing Arabic language curricula, emphasising the importance of balancing the functions of the left and right hemispheres of the brain. This approach has proven effective in enhancing cognitive, psychomotor, and affective aspects of learning. By integrating brain-based learning and character building, the curriculum is designed to naturally and meaningfully strengthen students' memory, comprehension, and creativity.[6]

Jamil and Nandang's study highlight the integration of neuroscience concepts in Arabic language learning goals within the Merdeka Curriculum framework. Emphasising a balance between the left and right brain functions, this approach encompasses the development of cognitive, affective, and psychomotor domains. Neuroscience-based learning is considered aligned with the Merdeka Belajar principles, which stress flexibility, innovation, and the development of critical thinking, creativity, communication, and collaboration (4Cs). This holistic approach, which involves both intellectual (IQ) and emotional (EQ) intelligence, has been shown to enhance the overall effectiveness of Arabic language acquisition.[7]

Syafiqoh et al. also explore the development of neuroscience-based Arabic curricula, highlighting the importance of optimizing both right and left-brain functions

[5] Mohammad Jailani et al., "Meneguhkan Pendekatan Neurolinguistik Dalam Pembelajaran: Studi Kasus Pada Pembelajaran Bahasa Arab Madrasah Aliyah," *Jurnal Pendidikan Agama Islam Al-Thariqah* 6, no. 1 (2021): 151–167; Aifanisa Rahman, "Mengoptimalkan Plasticitas Otak Dalam Pembelajaran Bahasa Arab : Pendekatan Neurolinguistik Untuk Mahasiswa," *Jurnal Ilmu Pendidikan, Bahasa, sastra, dan Budaya (Morfologi)* 2, no. 3 (2024): 239–250.

[6] Muhammad Ilfan Fauzi, "Pemanfaan Neurosains Dalam Desain Pengembangan Kurikulum Bahasa Arab," *Arabiyatuna : Jurnal Bahasa Arab* 4, no. 1 (2020): 1–20.

during the learning process. This approach integrates three core aspects; cognitive, psychomotor, and affective into a unified and holistic learning experience. Using brain-based learning principles, the curriculum is designed so that methods, strategies, and techniques align with neuroscience, while simultaneously fostering students' creativity, character, and innovation. As a result, this approach improves memory retention, conceptual understanding, and communication skills in Arabic more comprehensively and contextually.[8]

Muzakki's research investigates the reconstruction of teaching methods for Ilmu Sharf (Arabic morphology) for students of Arabic Language and Literature through a more enjoyable and meaningful approach. The implementation of the "Hijā'iyah Letters Formula Method" has proven to be more effective than conventional rote-based methods. In addition to being easier to understand and apply, this method also increases students' motivation and enthusiasm for learning. Statistical tests show a significant improvement in learning outcomes, making it an attractive and feasible alternative in teaching Arabic morphology.[9]

Al-Ghozali and Mujizah discuss the reconstruction of Arabic vocabulary memorization methods based on Multiple Intelligences theory within Islamic boarding schools (pesantren). Their study reveals that conventional methods, which do not account for students' diverse intelligences, tend to be less effective and make learning feel tedious. By tailoring memorization strategies to intelligence types, such as verbal-linguistic, visual-spatial, kinesthetic, and logical-mathematical learning becomes more engaging, easier to understand, and more motivating. This approach has proven effective in enhancing vocabulary acquisition in a more personalized and enjoyable way.[10]

Although various studies have demonstrated the effectiveness of neuroscience-based approaches in Arabic language learning, the main focus has been on curriculum development and general teaching methods, without giving specific attention to reconstructing vocabulary learning media. Meanwhile, vocabulary learning being the

[7] Sobrun Jamil and Ade Nandang, "Konsep Tujuan Pembelajaran Bahasa Arab Berbasis Neurosains dalam Kurikulum Merdeka Belajar," *Ta'limi: Journal of Arabic Education & Arabic Studies* 4, no. 1 (2025): 1–20.
[8] Syafiqoh et al., "Developing a Neurosains-Based Arabic Curriculum."
[9] Akhmad Muzakki, "Reconstruction of Morphological ('Ilmu Sharf) Learning Methods For Arabic Language and Literature Students," *Ijaz Arabi Journal of Arabic Learning* 4, no. 1 (2021): 193–208.
[10] M. Dzikrul Hakim Al-Ghozali and Silvia Nur Mujizah, "Rekonstruksi Metode Menghafal dalam Pembelajaran Mufradat Bahasa Arab Berbasis Teori Multiple Intelligence di Pondok Pesantren," *Islamika: Jurnal Keislaman dan Ilmu Pendidikan* 6 (2024): 529–544.

foundation of language skills requires media that are not only informative but also capable of stimulating balanced brain activity between the left and right hemispheres. To date, few studies have explicitly developed Arabic vocabulary learning media based on a neuroscience approach that fully integrates cognitive, affective, and psychomotor aspects. Thus, there is a significant gap in developing vocabulary learning media designed in accordance with neuroscience principles, aimed at creating a more holistic, contextual, and brain-friendly learning experience.

In light of this urgency, this article aims to examine and reconstruct Arabic vocabulary learning methods based on neuroscience through a conceptual approach. The focus of this study is not on developing new media or learning models, but rather on exploring relevant and applicable neuroscience principles for vocabulary learning, with an emphasis on the holistic integration of cognitive, affective, and psychomotor dimensions. This approach is expected to make a significant theoretical contribution in shaping more effective, human-centred, and contextually relevant Arabic language instruction, especially in optimizing vocabulary competence across various educational levels.

Method

This study employs a qualitative approach using library research. This approach was chosen because the focus of the study is not on product development or empirical testing in the field, but rather on a conceptual analysis of neuroscience principles relevant to Arabic vocabulary (*mufradat*) learning. This research aims to explore and reconstruct the theoretical framework of vocabulary learning based on a neuroscience perspective, emphasising the integration of cognitive, affective, and psychomotor aspects in language instruction.

The data sources in this study are secondary data obtained from various scholarly literatures, including books, journal articles, conference proceedings, dissertations, and official documents related to neuroscience, Arabic language education, and vocabulary learning. The data also include findings from previous studies discussing the integration of neuroscience principles in educational contexts, particularly in Arabic language learning.

Data collection was conducted through documentation techniques, which

involved identifying, organizing, and reviewing various relevant sources. The literature reviewed was selected purposively, taking into account the relevance of its content, its novelty, and its contribution to the focus of the study.

The data analysis technique follows the Miles and Huberman model. The stages of analysis include: (1) data reduction, by categorizing literature according to the focus of the study; (2) data display, by organizing the literature findings within a thematic framework; and (3) conclusion drawing, by formulating key concepts and theoretical implications of the neuroscience approach for Arabic vocabulary instruction. This analysis was carried out critically and systematically to produce a comprehensive and contextual conceptual synthesis.[11]

Results

Based on findings from the scholarly literature, several types of vocabulary (*mufradat*) learning methods commonly used by teachers in educational institutions have been identified. These methods reflect the diversity of instructional approaches currently applied in Arabic vocabulary instruction. The table below presents a compilation of commonly used vocabulary learning methods.

No	Author(s) and Year	Article Title	Learning Method Used	Research Findings
1	Ahmad et al. (2024)	The Urgency of Learning Methods in Arabic Language Instruction (for Non-Native Speakers)	- Muhadatsah Method (conversation) - Qawa'id wa Tarjamah Method (grammar and translation) - Mim-Mem Method (imitating and memorizing) - Eclectic Method (combination of several methods)	- Improved speaking skills (maharah kalam) and vocabulary mastery. - Students were more active in communication. - The combination of methods was effective for both grammar understanding and practical application.

[11] Matthew B. Miles, A. Michael Huberman, and Johny Saldana, *Qualitative Data Analysis*, *SAGE*, vol. 11, 2014, http://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng-8ene.pdf?sequence=12&isAllowed=y%0Ahttp://dx.doi.org/10.1016/j.regsciurbeco.2008.06.005%0Ahttps://www.researchgate.net/publication/305320484.

2	Anita Oktafia et al. (2023)	Implementation of the Fun Learning Method for Memorizing Arabic Vocabulary among Students at Roudlotut Tholibin, Metro City	Fun Learning Method (learning through play: singing, games, visual media)	- Students were more motivated and less bored. - Vocabulary mastery increased through songs and games. - Learning environment became more interactive and enjoyable.
3	Nadilah Adha Purba & Khoirul Jamil (2023)	The Use of Visual Media to Improve Arabic Vocabulary Mastery at Ta'dib Al-Syakirin Modern Boarding School, Grade VII	Visual Media (vocabulary visualization)	- Students memorized vocabulary more easily using images. - Increased learning interest due to non-monotonous methods. - Effective for concrete word comprehension.
4	Fiyani Nabilah & M. Abdul Gofur (2020)	Enhancing Arabic Vocabulary Recognition Skills through the Picture and Picture Method in Class IB at MI Nurul Anwar, North Bekasi	Picture and Picture Method (matching images with vocabulary)	- Significant improvement in vocabulary recognition (from an average of 58% to 88%). - Students were more enthusiastic and active. - A suitable method for visual learning in early childhood education.
5	Adhe Nor Aidah et al. (2023)	The Influence of the Tamyiz Method on Vocabulary Mastery in Arabic Subject for Grade V Students at SDI Al-Azhar 47 Samarinda	Tamyiz Method (grouping words by concept/theme, neurolinguistic approach,	- A positive and significant correlation between the Tamyiz method and vocabulary

			repetition with songs)	mastery (determination coefficient of 29.8%). - Students found it easier to recall and connect new vocabulary with prior knowledge.
6	Maftukhah et al. (2022)	Implementation of the Scramble Method in Arabic Vocabulary Learning for Grade V Students at SDIT Sabilul Qur'an Cendekia	Scramble Method (arranging scrambled words/sentences into meaningful form in groups)	- Improved concentration and student thinking speed. - Students memorized more vocabulary (12–15 words per session) compared to lecture-based methods (5 words per session).
7	Yayah Robi'atul Adawiyah et al. (2022)	Strengthening the Mubasyaroh Method in Arabic Vocabulary Learning at the Special Study Group Institution (KSK) Fathimatuzzahro', Paiton Probolinggo	Mubasyaroh Method (direct learning without translation, focus on conversation practice)	- Students found it easier to pronounce vocabulary with proper accent (lahjah). - Improved speaking ability and contextual understanding of vocabulary usage.
8	Masfiyatul Asriyah (2021)	Implementation of the Drill Method to Enhance Arabic Vocabulary Memorization Among Grade VII Students	Drill Method	- Improved memorization skills of junior high students through two learning cycles. - Clear enhancement in both oral and written test results.

Table 1: Findings on Vocabulary Learning Methods

The table above summarizes various methods of teaching Arabic vocabulary (mufradat) that have been implemented in educational settings for non-Arabic speakers. Each study presents diverse pedagogical approaches, with findings demonstrating the effectiveness of each method in improving vocabulary mastery, learning motivation, and students' communication skills. From a neuroscience perspective, the success of these methods can be analyzed based on principles of neural network activation, emotional engagement, and long-term memory reinforcement.

1. The Urgency of Reconstructing Vocabulary Learning Methods

Reconstructing Arabic language learning methods, particularly in vocabulary acquisition (mufradat), is essential to create more meaningful and comprehensible learning experiences for students. Several challenges have emerged that necessitate this reconstruction, especially in line with the rapid development of technology.

Based on previous research literature, teaching Arabic vocabulary in an online context still faces various difficulties. The methods used are conventional, such as rote memorisation and direct translation, without clear contextualization. As a result, students struggle to understand and apply vocabulary communicatively. Furthermore, limited technology and minimal interactivity make the learning process passive and boring. A sense of alienation also arises due to the lack of social interaction, which is crucial in language learning. These problems highlight the need for a more contextual, interactive approach that aligns with the demands of the digital era.[12]

Further literature explains that the challenges in Arabic vocabulary learning include low motivation, the ineffectiveness of traditional methods, limited technological access, and minimal teacher-student interaction, which are major obstacles for non-native speakers.[13]

Additionally, research indicates that vocabulary learning difficulties faced by Persian speakers of Arabic include language interference, vocabulary deficits, dominance of grammar-based approaches, and lack of awareness regarding nuances

[12] Cristina Solimando, "E-Learning and Arabic in the Age of Covis-19: Rethinking the Learning of Vocabulary," 2022.
[13] Sultan A. Almelhes, "Gamification for Teaching the Arabic Language to Non-Native Speakers: A Systematic Literature Review," *Frontiers in Education* 9, no. March (2024): 1–11.

in borrowed words. Addressing these issues requires a more contextual and communicative vocabulary teaching approach.[14]

The dominance of conventional methods, such as memorization alone without considering learners' individual learning styles, exacerbates the situation. Therefore, there is an urgent need to develop more relevant and contextual vocabulary learning methods that integrate knowledge about how the brain works during learning. These new methods should stimulate students' cognitive, affective, and psychomotor abilities simultaneously to enhance their vocabulary acquisition effectively.

2. The Contribution of Neuroscience to Language Learning

Neuroscience theory is a modern educational approach that emphasizes how students' brain nerves function. However, in practice, many educators still do not fully understand how the brain works during the learning process. They tend to teach according to personal preferences without considering the brain's capabilities that can support the learning process. Therefore, to recognize the diverse potentials of students and maximize the brain's neural functions, teachers need to understand neuroscience theory.[15]

Neuroscience offers deep insights into how the brain operates during learning. Knowledge of the brain's structure and functions can provide educators with new perspectives in designing more effective learning methods. The integration of brain-based learning principles shows that learning which stimulates both hemispheres, the analytical left brain and the creative right brain can enhance students' absorption of information more effectively and meaningfully.[16]

Maximizing the role of neuroscience in the learning process will improve learning outcomes. Learning is closely related to the performance of the cerebrum, as the cerebrum is responsible for thinking, language, judgment, reasoning, problem-

[14] Isa Mottaghizadeh and Tahereh Khanabadi, "Statistical Analysis of Vocabulary Interference and Its Role in Writing Skill of Arabic Language," *Language Related Research* 11, no. 4 (2020): 297–326.
[15] Wiwik Damayanti, Sutarto, and Ermis Suryana, "Teori Neurosciense dalam Pembelajaran Pendidikan Agama Islam," *Jurnal Literasiologi* 10 (2020): 175–186.
[16] Ahmad Muttaqin, Siti Nurfadlah, and Iis Maesaroh, "Integrasi Neurosains Dalam Pendidikan : Studi Literatur Tentang Proses Belajar Berbasis Otak," *PAIDAGOGIA: Jurnal Pengajaran dan Pendidikan* 1, no. 1 (2024): 36–42.

solving, awareness, emotional processing, visual ability, hearing, and movement[17]. Several brain circuits that play important roles in memory formation include the amygdala, prefrontal cortex, and hippocampus. The amygdala is vital for processing emotions and interacts with other structures such as the hypothalamus and brainstem. The hippocampus is associated with spatial navigation and contextual memory.[18]

The role of neuroscience is particularly relevant when linked to language learning. In language acquisition and brain function, there is a specific term called neurolinguistics. Neurolinguistics is a learning approach that involves brain function and sensory organs, especially the tongue, as the basis for thinking and communication to achieve desired outcomes. This approach emphasizes the main role of both the right and left brain in responding to the synchronization of tongue movement during speech. Thus, neurolinguistics focuses on the coordination between the brain, especially the right hemisphere, and the tongue in actively, accurately, and correctly producing speech sounds.[19]

In the context of Arabic language learning, a neuroscience-based approach provides insights into the importance of designing learning activities that activate brain areas relevant to language mastery, such as those responsible for memory, language comprehension, and emotion regulation. This not only accelerates the learning process but also makes learning more enjoyable and aligned with the brain's natural functioning.

3. Integration of Three Learning Domains: Cognitive, Affective, and Psychomotor

The application of neuroscience in *mufradat* (vocabulary) learning not only focuses on the cognitive aspect but also includes the affective and psychomotor domains. Arabic language learning must stimulate these three domains to achieve optimal results.

Cognitive: *Mufradat* learning can be carried out using strong meaning association techniques, concept maps, and meaningful repetition. This method facilitates the storage of vocabulary in long-term memory because the brain more

[17] Zaimatuz Zakiyah et al., "Desain Pengembangan Kurikulum Pembelajaran Bahasa Arab di Madrasah Berbasis Diferensiasi Otak Laki-Laki dan Perempuan (Studi Perspektif Neurosains)," *Mukaddimah: Jurnal Studi Islam* 6, no. 1 (2021): 60–83.
[18] Yuliana, "Peran Neurosains dan Sirkuit Otak dalam Memori Belajar," *Prosiding Seminar Nasional Sanata Dharma Berbagi (USDB)* 2 (2024): 270–275, https://doi.org/10.4135/9781483381411.
[19] Jailani et al., "Meneguhkan Pendekatan Neurolinguistik Dalam Pembelajaran: Studi Kasus Pada Pembelajaran Bahasa Arab Madrasah Aliyah."

easily remembers information that has clear and contextual relationships. This aligns with Elyatul's research, which explains that the cognitive domain relates to aspects of knowledge and understanding, such as mastery of grammar, vocabulary, and sentence structure.[20]

Affective: Positive emotional experiences during the learning process increase students' motivation to continue learning. Neuroscience-based approaches prioritise enjoyable, empathetic, and deep learning experiences so that students feel emotionally engaged in the learning process. Managing emotions in the context of language learning creates a stronger connection between students and the material being learned.

This is also in line with Elyatul's explanation that the affective domain concerns students' attitudes, values, and motivation towards Arabic language learning, including how they appreciate the language as part of culture and religion[21].

Psychomotor: The use of visual media, movement, and simulations related to vocabulary can stimulate brain activities connected to motor skills. For example, through kinesthetic-based games or activities linking body movements with vocabulary, students not only memorise but also experience the meaning of words in real contexts.

Elyatul also mentions that the psychomotor domain is related to practical skills such as speaking, listening, writing, and actively reading Arabic[22].

The concept of integrating cognitive, affective, and psychomotor domains is supported by the "Kurikulum Merdeka" (Independent Curriculum), which centres on student-focused and flexible learning. In this context, integrating these three domains is essential to create meaningful and comprehensive learning experiences. Learning no longer relies solely on memorisation and theory but also involves practical activities and character strengthening. For example, after understanding a text (cognitive), students are invited to reflect on the values contained in the text

[20] Elyatul Mu'awanah and Ita Nurmala, "Analisis Integrasi Ranah Afektif, Kognitif, dan Psikomotorik Dalam Pembelajaran Bahasa Arab Di Madrasah Aliyah: Perspektif Kurikulum Merdeka," *Advances In Education Journal* 1 (2023): 140–152.
[21] Elyatul Mu'awanah and Ita Nurmala, "Analisis Integrasi Ranah Afektif, Kognitif, dan Psikomotorik Dalam Pembelajaran Bahasa Arab Di Madrasah Aliyah: Perspektif Kurikulum Merdeka".
[22] Elyatul Mu'awanah and Ita Nurmala, "Analisis Integrasi Ranah Afektif, Kognitif, dan Psikomotorik Dalam Pembelajaran Bahasa Arab Di Madrasah Aliyah: Perspektif Kurikulum Merdeka".

(affective), then present it in Arabic (psychomotor). This approach not only enhances students' language competence but also shapes a characterful personality that is tolerant toward other cultures[23].

Discussion

1. Reconstruction of Vocabulary Learning Methods from a Neuroscience Perspective

Based on the identified types of mufradat learning methods presented in the table, there is a need to reconstruct the concept of how these methods are linked to neuroscience principles. Neuroscience principles emphasise the cognitive, affective, and psychomotor aspects. The following explanation describes methods that incorporate neuroscience principles specifically for Arabic language learning, particularly in the area of vocabulary (mufradat).

a. Fun Learning Method

The Fun Learning method is described as an enjoyable and engaging learning approach. Its goal is to create a learning environment where students feel happy, making it easier for them to absorb and understand the material[24].

Fun Learning incorporates elements of games and music that activate the limbic system, particularly the amygdala and hippocampus, which are closely linked to positive emotions and memory retention[25]. A pleasurable learning experience stimulates dopamine release, enhancing intrinsic motivation and the efficiency of encoding new information[26].

No	Learning Step	Student Activities	Fun Learning Method	Neuroscience Principles Used
1	Warm-up (Pre-Activity)	Students sing an opening song or chant containing several new vocabulary words.	Singing games, chanting	Emotion boosts learning (Positive emotions, such as joy, prepare the brain for learning).

[23] Elyatul Mu'awanah and Ita Nurmala, "Analisis Integrasi Ranah Afektif, Kognitif, dan Psikomotorik Dalam Pembelajaran Bahasa Arab Di Madrasah Aliyah: Perspektif Kurikulum Merdeka".
[24] Susan Nurwidianing, Nana Hendracipta, and Reksa Adya Pribadi, "The Process of Developing Students ' Learning Activities Through The Application Of Fun Learning Method At An-Nur Sdi," *Pionir: Jurnal Pendidikan* 14, no. 1 (2025): 102–116.
[25] Mary Helen Immordino-Yang and Antonio Damasio, "We Feel, Therefore We Learn: The Relevance of Affective and Social Neuroscience to Education," *Journal Compilation* 1 (2007).
[26] F. Gregory Ashby, Alice M. Isen, and And U. Turken, "A Neuropsychological Theory of Positive Affect and Its Influence on Cognition," *Psychological Review* 106, no. 3 (1999): 529–550.

				Rhythmic repetition (strengthens long-term memory).
2	Vocabulary Introduction	The teacher shows pictures (e.g., classroom objects) → students name them in Arabic while mimicking gestures or expressions.	Visual guessing, Total Physical Response (TPR)	Multisensory input (Engages visual, motor, and auditory senses to strengthen synapses). Embodied cognition (Learning through bodily movement enhances memory).
3	Association and Games	Students play memory card games, match words to pictures, and play group guessing games.	Card games, team guessing games	Play activates dopamine (Enhances memory and motivation). Social learning (Strengthens neural connections through interaction).
4	Contextual Usage	Students create simple sentences using new vocabulary in short dialogues or sketches.	Role play, story completion	Meaningful use (The brain stores contextual information more easily). Active recall (Strengthens memory networks).
5	Meaningful Repetition	Students play vocabulary review games (e.g., Bingo, Arabic snakes and ladders), repeating in varied ways from before.	Game-based review, competition	Spaced repetition (Repetition in different contexts strengthens long-term memory). Reward-based learning (Triggers pleasure hormone—dopamine).
6	Reflection and closing	Students mentioned 3 words they remembered best and explained why they liked those vocabulary words.	Personal reflection, exit ticket	Self-reflection and emotion tagging (Makes information more “sticky”). Metacognition (Enhances learning awareness).

Table 2: Fun Learning Method and Neuroscience Principles

Every "fun" activity is not merely play, but is purposefully designed to support the brain's ability to absorb and retain language. Positive emotions, physical engagement, social interaction, and meaningful repetition are the foundational principles of neuroscience-based learning.

The reconstruction of the fun learning method in Arabic vocabulary (mufradat) instruction through a neuroscience-based approach is an innovative strategy aimed at enhancing vocabulary acquisition by aligning teaching methods with how the brain naturally works. This approach emphasises emotional involvement, physical activity, and multisensory stimulation in the learning process.

Activities such as singing, educational games, body movements, and role-playing not only create an enjoyable learning environment but also stimulate the neural centres responsible for long-term memory formation. The neuroscience principles underlying this approach include reinforcement through meaningful repetition, positive emotional association, social interaction, and active student involvement in both thinking and movement.

Therefore, vocabulary learning no longer centres around rote memorisation, but instead focuses on contextual, meaningful experiences that align with the brain's neurological mechanisms. The implications of this reconstruction show great potential in improving vocabulary retention, learning motivation, and student engagement in Arabic language learning[27].

b. Picture and Picture Method

The Picture and Picture method is a cooperative learning model that uses a series of images arranged in a logical sequence. The teacher provides images related to the lesson material, and students are then asked to arrange them in the correct order[28].

This method, along with visual media, emphasises visual learning. Concrete visualisation stimulates the visual area of the brain (visual cortex) and

[27] Al-Ghozali And Mujizah, "Rekonstruksi Metode Menghafal Dalam Pembelajaran Mufradat Bahasa Arab Berbasis Teori Multiple Intelligence di Pondok Pesantren."

[28] Desty Andian Puteri, Kundharu Sadhono, and Ani Rakhmawati, "Upaya Meningkatkan Keterampilan Menulis Dengan Metode Pembelajaran Picture And Picture Di Sekolah Dasar," *Didaktika: Jurnal Kependidikan* 12, no. 1 (2023): 29–34.

strengthens semantic associations, which are essential for forming mental representations of vocabulary.[29]

The following is a design of the Picture and Picture method that can be used in teaching Arabic vocabulary (mufradat) through a neuroscience-based approach.

No	Learning Step	Learning Activity	Neuroscience Principles Applied
1	Motivation and Schema Activation	The teacher shows engaging, relevant images (e.g., kitchen, living room, school) and asks: "What is this in Arabic?"	Positive emotions trigger attention; the brain learns better when it feels interested and safe
2	Visual and Verbal Association	Images are shown one by one; students guess while the teacher says the Arabic vocabulary (e.g., 🍎 → tuffāḥah) and writes it on the board.	Multisensory input (visual and verbal) strengthens synaptic connections; meaningful repetition supports long-term memory
3	Sequencing the Pictures	Students arrange images into a logical sequence based on a story or context created by the teacher (e.g., daily activities at home or school).	The brain favours patterns and order; building logical connections reinforces declarative memory
4	Movement or Role Play (Kinesthetic)	Students point to parts of the image while saying the vocabulary, or act out scenes: "I enter the bāb (door)", "This is my ghurfah (room)".	Physical movement enhances memory processing; mirror neurons support learning through imitation
5	Reinforcement and Repetition with Variation	The teacher gives a short quiz with picture cards, word guessing, or matching games (e.g., "find the pair" of image and word).	Varied repetition strengthens memory retention; light rewards release dopamine for positive reinforcement
6	Reflection and Emotional Integration	Students create and tell a story from the arranged pictures, then reflect: "Which word did you like the most? Why?"	Emotional involvement deepens memory traces; emotional processing enhances concept integration.

Table 3: Picture and Picture Method in Vocabulary Learning (Neuroscience Approach)

The reconstruction of the Picture and Picture method in vocabulary learning based on neuroscience is an effort to integrate images, physical activity,

[29] Allan Paivio, "Mental Representations: A Dual Coding Approach," *Oxford University Press* (2008), https://doi.org/10.1093/acprof:oso/9780195066661.001.0001.

emotions, and brain function principles to enhance the effectiveness of Arabic vocabulary acquisition.

The process begins by stimulating student motivation and activating their schemata through engaging images, followed by associating the pictures with Arabic vocabulary using a multisensory approach. Students then arrange the images in a logical sequence according to a context or story, which helps the brain form patterns and logical connections.

This activity is followed by physical movement or role-playing, which engages the body and supports memory reinforcement through kinesthetic learning and the activation of mirror neurons.

Next, reinforcement is carried out through light quizzes or games that stimulate dopamine release as a form of reward and positive reinforcement. In the final stage, reflection is encouraged by having students create a story from the images and connect the vocabulary to their emotions. This deepens memory traces and builds emotional engagement. Through this approach, the Picture and Picture method becomes more than just a visual aid, it becomes a comprehensive strategy aligned with the way the brain naturally absorbs and retains language[30].

c. Tamyiz Method

The Tamyiz method is described as an approach used to enhance students' understanding of Arabic vocabulary (mufradat) and sentence structure. This method is designed to help learners contextually comprehend Arabic grammar (nahwu and sharaf)[31]. It is also recognised as a strategy for distinguishing and categorising words in the Arabic language learning[32].

The Tamyiz method is based on conceptual grouping and a neurolinguistic approach. This strategy facilitates the integration of vocabulary meaning into the existing mental schema in the brain, reinforcing neural connectivity through

[30] Ade Yurika Isti MegawatI, Eka Putri Aprilia, and Miftah Jayanti Rizky Nur Afifah Rokhmaniyah, "Penerapan Model Pembelajaran Problem Based Learning Dengan Picture and Picture Pada Materi Ekosistem Intuk Meningkatkan Hasil Belajar Siswa Kelas V SD Negeri Sabranglor," *Social, Humanities, and Educational Studies* 7, no. 4 (2024): 301–307.

[31] Raswan, "Tamyiz; Model Alternatif Pembelajaran Bahasa Arab Sebagai Bahasa Al-Qur'an," *Journal of Arabic Learning and Teaching* 6, no. 95 (2017): 18–28.

[32] Yanuar Arafat, Muhammad Misdar, and Muhammad Naufal, "Metode Tamyiz Dalam Keterampilan Bahasa Arab Santriwan (Studi Kasus Di Pondok Pesantren Muqimussunnah Palembang)," *TADRIB: Jurnal Pendidikan Agama Islam* 6, no. 1 (2020): 62–77.

semantic association and rhythmic repetition[33], both of which play significant roles in strengthening long-term memory[34].

No	Learning Step	Learning Activity	Neuroscience Principle	Explanation
1	Visual Tamyiz (Word Visualisation)	The teacher displays pictures/illustrations of vocabulary objects, e.g., a picture of "كتاب" (book), "قلم" (pen).	Visual memory Dual coding theory	The brain remembers words more easily when paired with visual images. Pictures and texts work in parallel in the brain.
2	Auditory Tamyiz (Pronunciation & Listening)	Students listen to the vocabulary pronounced by the teacher and repeat it together with a simple rhythm/lyrics.	Auditory learning Repetition strengthens memory	Rhythmic auditory repetition enhances long-term memory strength and facilitates Arabic phonological learning.
3	Contextual Tamyiz (Usage in Sentences)	Students are given sample sentences using new vocabulary, then asked to create their own.	Meaningful learning Contextual learning enhances retention	Information with contextual meaning is easier for the brain to understand and retain.
4	Kinesthetic Tamyiz (Movement & Role-play)	Students point to or act out the meaning of the word. Example: pointing at a window while saying "نافذة".	Embodied cognition Motor memory	Learning that involves physical movement strengthens neural connections and enhances retention.
5	Emotional Tamyiz (Storytelling & Humour)	The teacher uses funny or interesting stories that incorporate new vocabulary.	Emotion enhances learning Amygdala activation	Emotionally engaging information is stored more strongly in the brain due to amygdala activation.
6	Interactive Tamyiz (Games or Quick Quiz)	Using image-based quizzes, word-guessing games, or digital	Active engagement Reward system (dopaminergic)	Active interaction and fun experiences trigger dopamine release, boosting

[33] Richard W. Schmidt, "The Role of Consciousness in SecondLlanguage Learning," *Applied Linguistics* 11, no. 2 (1990): 129–158.
[34] Jeffrey D. Karpicke and Henry L. Roediger, "The Critical Importance of Retrieval for Learning," *Science* 319, no. 5865 (2008): 966–968.

		games like Kahoot/Quizlet.		motivation and memory.
7	Reflective Tamyiz (Review and Vocabulary Journal)	Students rewrite daily vocabulary in a visual journal (drawing + writing the word).	Reflective consolidation Metacognition	Reflection strengthens understanding and stabilises long-term memory.

Table 4: Tamyiz Method Design Based on Neuroscience Principles in Arabic Vocabulary Learning

d. Scramble Method

The Scramble Method is a cooperative learning model designed to encourage students to think critically by arranging scrambled answers. This approach balances creativity and logic by allowing students to engage in tasks that activate both the left and right hemispheres of the brain.[35]

The Scramble Method stimulates syntactic and logical processing through sentence structure reconstruction. This activity involves the brain's executive functions located in the prefrontal cortex, which are responsible for managing information and decision-making (Diamond, 2013), thus enhancing thinking speed and concentration.[36]

The reconstruction of the Scramble Method based on neuroscience aims to enhance its effectiveness by activating positive emotions, engaging multiple sensory modalities (visual, kinesthetic, and auditory), and providing real-life context to facilitate brain processing and build strong, long-term memory associations. Below is the redesigned Scramble Method using a neuroscience-based approach.[37]

No	Learning Step	Activity	Neuroscience Principle Used
1	Emotional Trigger & Context	The teacher shows a picture of the human body and demonstrates it. Example: pointing to the nose: **أنف**.	Visual input, body movement, and real-life context

[35] Irma Trismawati, Nurhamim, and Ubaidillah, "Pengaruh Penerapan Metode Scramble Dalam Pembelajaran Nahwu Terhadap Pemahaman Siswa," *AS_SABIQUN Jurnal Pendidikan Islm Anak Usia Dini* 7 (2025): 196–208.
[36] John Sweller, "Cognitive Load Theory," *Psychology of Learning and Motiation* 55 (2011): 37–76, https://doi.org/10.1016/B978-0-12-387691-1.00002-8.
[37] K. Pradeep et al., "Neuroeducation: Understanding Neural Dynamics in Learning and Teaching," *Frontiers in Education* 9 (2024).

2	Visual-Interactive Scramble Game	Students are given scrambled Arabic letters on magnetic paper/stickers. They compete to form the correct word that matches the image (e.g., image of an eye → letters: ع، ي، ن).	Physical movement (kinesthetic), positive competition, and visual reinforcement
3	Cooperative & Emotional	Students work in small groups. The fastest to arrange and translate gets a small reward (stars/stickers).	Collaboration, positive emotion, and motivation
4	Auditory Affirmation	After arranging the words, students read them together and sing a simple song about body parts in Arabic.	Auditory activation, rhythmic repetition
5	Reflection & Meaningful Reinforcement	The teacher asks, "What is your favourite body part and why?" in simple Arabic. Students respond using the new vocabulary.	Personal meaning, episodic memory

Table 5: Scramble Method Design Based on Neuroscience Principles in Arabic Vocabulary Learning

Neuroscience principles, as shown in the table above, are closely related to how the brain functions. Personal meaning and episodic memory are particularly relevant to the reflection and meaning reinforcement stages in Arabic vocabulary (mufradat) learning.

Personal meaning refers to the unique significance that an individual assigns to a life experience. The more personally meaningful an event is, the more likely it is to be stored in episodic memory—a type of memory that records personal experiences along with details of time, place, and emotions. The connection between the two shows that personal meaning strengthens a person's ability to recall life experiences, thus playing a vital role in the development of identity and self-awareness[38].

The reconstruction of the Scramble method in vocabulary learning based on neuroscience demonstrates that multisensory involvement (visual, kinesthetic, and auditory), the use of real-life context, and the enhancement of positive emotions and personal meaning can significantly improve the effectiveness of Arabic vocabulary acquisition. This approach not only enriches the learning

[38] Siti Azri Ulmi Ramadhanty and Harsawibawa Albertus, "Memori Episodik Sebagai Terra Incognita Yang Membatasi Neuroteknologi," *SyntaxIdea* 3 (2021): 649–670.

experience but also optimises brain function by facilitating the absorption, storage, and retrieval of information through the activation of episodic memory and the natural reinforcement of neural connections.

e. Mubasyaroh Method

The Mubasyaroh method is a direct teaching approach in which the teacher delivers lessons face-to-face without the use of intermediary tools such as media or visual aids. Learning takes place through direct interaction between the teacher and students.[39]

The Mubasyaroh method employs a direct approach without translation, resembling the natural process of language acquisition. This method activates the right hemisphere of the brain, which is involved in contextual processing and pronunciation.[40] It aligns with language acquisition theories that emphasise the importance of meaningful and low-anxiety input.

No	Steps	Learning Activities	Neuroscience Principles Used
1	Contextual Vocabulary Introduction	The teacher shows real objects or pictures (e.g., كتاب, كرسي, باب) and directly states their Arabic names.	Visual-spatial recognition: The brain better captures information accompanied by visuals. Direct sensory input accelerates neuronal connections for new memories.
2	Association and Demonstration	The teacher shows the object while pronouncing the vocabulary and asks students to imitate while touching/seeing the object.	Multisensory learning (visual, auditory, and movement) strengthens memory retention. Motor encoding helps the brain form strong networks.
3	Movement and Interaction Activities	Students are asked to stand and point to objects while saying their Arabic names. This can be mixed with quick games like "say and point."	Kinesthetic engagement activates the motor brain areas and strengthens memory. Immediate practice reinforces new synapses.
4	Meaningful Repetition	Vocabulary is repeated in different contexts: songs, light dialogues, or short	Spaced repetition extends memory retention duration. Emotionally engaging

[39] Novi Mutmainah and Lina Marlina, "Implementasi Metode Mubasyarah Dalam Pembelajaran Muhadatsah," *Tsaqofiya : Jurnal Pendidikan Bahasa dan Sastra Arab* 2, no. 2 (2020): 30–43.
[40] Ellen Bialystok, Fergus Craik, and Gigi Luk, "Cognitive Control and Lexical Access in Younger and Older Bilinguals," *Journal of Experimental Psychology: Learning Memory and Cognition* 34, no. 4 (2008): 859–873.

		illustrated stories.	content facilitates longer storage of information in the brain.
5	Contextual Interaction and Role-play	Students role-play using vocabulary in real-life situations, such as in class, at home, at the market, etc.	Contextual memory helps the brain store information in interconnected networks. Social learning activates mirror neurons.
6	Reflection and Reinforcement	The teacher reviews vocabulary using different media (pictures, sounds, actions). Students are asked to compose short sentences.	Active recall strengthens memory traces. Neuroplasticity is formed when students actively think and make associations.

Table 6: Mubasyarah Method Design Based on Neuroscience Principles in Arabic Vocabulary Learning

The reconstruction of the *Mubasyaroh* (direct) method based on neuroscience in vocabulary learning results in a more active, contextual approach that aligns with how the brain processes language acquisition. By combining visual stimuli, movement, positive emotions, and social interaction, this method not only delivers vocabulary directly but also strengthens students' long-term memory through the activation of various brain systems such as the sensory, motor, and limbic systems.[41]

Each step of the learning process from vocabulary introduction, association with real objects, meaningful repetition, to role-playing applies fundamental neuroscience principles such as multisensory learning, synaptic strengthening through repetition, and engagement of emotion and social context. As a result, students do not merely memorise vocabulary verbally but also experience and bring the language to life in an enjoyable and meaningful learning environment.[42]

Thus, this reconstruction enhances the effectiveness of vocabulary learning and promotes the formation of stronger, more natural, and practical language memory applicable in daily life.

[41] Nasim Bahari and Younos Dost Mohammadi, "Multisensory Learning and Vocabulary Retention: An Emotioncy-Based Study with the Stroop Task," *Cognition, Emotion & Education* 1 (2023).
[42] Ibid.

Conclusion

Arabic vocabulary learning has traditionally been monotonous, less contextual, and has not yet maximised the brain's potential in the learning process. This article demonstrates that a neuroscience-based approach offers innovative solutions through the reconstruction of more enjoyable, interactive learning methods aligned with the workings of the human brain. By integrating neuroscience principles, such as emotional involvement, multisensory stimulation, and meaningful repetition into methods like fun learning, picture and picture, tamyiz, scramble, and mubasyaroh, vocabulary learning can become more effective in enhancing students' absorption, retention, and understanding of Arabic vocabulary.

This reconstruction not only emphasises the cognitive aspects but also holistically incorporates affective and psychomotor domains. The approach encourages teachers to act as facilitators of brain-based learning rather than mere deliverers of content. Therefore, integrating neuroscience into Arabic language learning, especially vocabulary acquisition, is a strategic step toward creating more meaningful, humane, and long-lasting learning experiences. This article also opens opportunities for further development of media and learning models that align with brain function principles, addressing the challenges of 21st-century education.

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