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The Al-Qur'an Memorization Siyaq Method And Its Relationship With Neurological Activity: An Analysis Based On Experimental Study

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ABSTRACT

This study discusses the effectiveness of the al-Qur'an memorization siyaq method from a neuroscience perspective, based on findings from an experimental study conducted on students from institutions of higher learning. The siyaq method is a context-based memorization approach that emphasizes understanding the continuity of meaning within the verses of a surah in the Qur'an. This study employed a T-test analysis to assess the impact of the method on students' memorization performance. The results showed a statistically significant difference between the treatment group (M = 12.03, SD = 0.81) and the control group (M = 0.93, SD = 0.40), with t(29) = 14.802 and p = 0.001. These findings are discussed in relation to neurological functions such as hippocampus activity, the prefrontal cortex, and the concept of neuroplasticity that supports long-term memory formation. The siyaq method was found to stimulate higher cognitive activity through meaningful repetition and semantic processing, aligning with brain-based learning principles. This study recommends the integration of the siyaq method in modern tahfiz education and opens avenues for further research using neuroscience tools such as EEG

[1]Kamarudin, W. A. Z. W., Kamaruzaman, A. F., Kadir, F. K. A., & Fadzil, A. F. M. (2020). Aplikasi Model Hafazan al-Qur'an Ulul Albab di Sekolah Imtiaz Terengganu [Application of the Model Memorizing the Qur'an Ulul Albab in School Imtiaz Terengganu]. BITARA International Journal of Civilizational Studies and Human Sciences (eISSN: 2600-9080), 3(3), 10-33.

[2]Ahmad, M. R., Bahri, S., Wong, M. S. A., & Ismail, A. T. (2022). Isu Dan Cabaran Pelajar Plus Tahfiz Dalam Mengekalkan Hafazan Al-Quran Di UiTM: The Issues and Challenges of Plus Tahfiz Students in Maintaining the Memorisation of The Quran in UiTM. Journal of Fatwa Management and Research, 27(2), 27-36.

or neurofeedback to deepen the understanding of brain activity during memorization.

1. INTRODUCTION

The memorization of the Qur'an is a noble practice that is not only traditionally inherited but also forms a cornerstone of Islamic education across various institutions.1 However, challenges in memorizing the Qur'an have become increasingly apparent, especially among students in institutions of higher learning, who often face tight academic schedules, psychological pressure, and motivational constraints.2 Conventional memorization methods typically rely on mechanical repetition without emphasizing the understanding of meaning or contextual continuity between verses.3 As a result, many students struggle to retain their memorization in the long term.

In response to these limitations, the al-Qur'an memorization siyaq method is introduced as an alternative approach that is more cognitive and semantic in nature. This method focuses on the relationship between preceding and succeeding verses (siyaq), helping students grasp the structure and overall meaning of the verses, thereby facilitating more effective memorization. The siyaq method consists of seven main steps:[4]

1. **Reading the Qur'anic verses:** The first step in quality memorization is to read the verses intended for memorization thoroughly. The primary aim of this reading is to ensure the memorization is accurate. Quality memorization begins with fluent recitation.
2. **Reading the translation**: This memorization method involves understanding the content of the verses. Therefore, reading the translation beforehand helps in understanding the message of the verse.
3. **Understanding siyaq maqta'**: Siyaq maqta' refers to the division of verses on each page into thematic segments. These segments are grouped based on related themes, typically ranging from two to four sections per page.
4. **Memorizing the beginning words of verses:** Memorizing the initial words of each verse on a page greatly assists and accelerates the memorization process. This step stimulates the brain before attempting to memorize the full verses.
5. **Memorizing siyaq lafaz**: Siyaq lafaz refers to the repetition or similarity of specific words within a page. Identifying these similarities makes memorization easier by recognizing repeated phrases or word patterns.
6. **Understanding siyaq meaning (siyaq makna)**: This step involves understanding the semantic connections between verses. Comprehending the meaning of each verse and its connection to others enhances memorization and reinforces memory. This is grounded in a strong understanding of the verse translations.
7. **Understanding siyaq safhah:** Siyaq safhah refers to the connection between the end of one page and the beginning of the next, either through recurring words or shared meanings.

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[2]Ahmad, M. R., Bahri, S., Wong, M. S. A., & Ismail, A. T. (2022). Isu Dan Cabaran Pelajar Plus Tahfiz Dalam Mengekalkan Hafazan Al-Quran Di UiTM: The Issues and Challenges of Plus Tahfiz Students in Maintaining the Memorisation of The Quran in UiTM. Journal of Fatwa Management and Research, 27(2), 27-36.

[3]Salihin, M. S., Pisol, M. I. M., Yahaya, M., Abd Hamid, M. H., & Harun, Z. A. (2022). Pengukuhan Hafazan Al Quran: Cabaran & Penyelesaian: Al-Quran Memorization Enhancement: Challenges and Solution. QIRAAT: Jurnal Al-Quran dan isu-isu kontemporari, 5(2), 34-40.

[4]Tahir, N. S., Husain, M. Z., Naqibah, K., Yussop, Y., & Yahya, S. (2024). Hubungkait Antara Neurosains Dan Kaedah Hafazan Al-Qur'an Siyaq Dan Peranannya Dalam Peningkatan Prestasi Hafazan. Jurnal Tafsere, 12(1), 1-25.

These steps support meaningful learning and stimulate various cognitive brain functions such as semantic memory, attention, visualization, and conceptual mapping. Unlike mechanical memorization, students using this method do not merely memorize the text verbatim but understand the interconnectedness of the verses within the broader context of the surah.

In the context of neuroscience, memorization involves not only recalling information but also complex brain activities such as hippocampus activation, semantic processing in the temporal lobe, and executive functions in the prefrontal cortex.5 Neuroscience findings indicate that meaningful learning and contextual repetition can strengthen synaptic connections through a process known as neuroplasticity.6 Therefore, the siyaq method has the potential to positively impact the formation of long-term memory among students who apply it. This study aims to explore the relationship between the al-Qur'an memorization siyaq method and students' neurological activity, based on empirical analysis using a T-test comparing a treatment group and a control group. The results will be examined in the context of brain functions related to memorization and discussed within the framework of modern neuroscience theory.

2. RESEARCH METHODOLOGY

This study is a quantitative research project that employs a true experimental design using pre test and post-test procedures. In this design, the researcher utilizes both a control group and a treatment group. The control group applies a different Qur'an memorization method, while the treatment group applies the al-Qur'an memorization siyaq method. Data generated from this design are inferential in nature and will be analyzed using a paired T-test.

The study population consists of male and female university students enrolled in a Qur'an memorization course starting from Juz 1. These students must have never previously memorized the Qur'an from Juz 1 and must be in their first year of study in a faculty with an Arabic-based curriculum, as the al-Qur'an memorization siyaq method was developed according to their syllabus. The total population for this study is 134 individuals, and the sample comprises 97 students, determined based on the Krejcie & Morgan (1970)[7] sampling table. The sampling method used in this study is simple random sampling. From these 97 students, 10% (i.e., 10 students) participate in a pilot study. Then, only 60 students who are easily accessible, willing to cooperate, and pass the recitation test proceed to the true experimental phase. These 60 students are divided into two groups: the control group with 30 students (15 males and 15 females), and the treatment group with 30 students (15 males and 15 females).

• Research Procedure

Participants undergo a memorization test administered twice—pre-test and post-test. In the pre test, both the control and treatment groups use other Qur'an memorization methods. After two weeks, the post-test is conducted, during which the control group continues with the same method, while the treatment group switches to the al-Qur'an memorization siyaq method. The memorization test is conducted as follows:

[5]Izzah, N. (2022). PENGARUH SENAM OTAK (BRAIN GYM) TERHADAP DAYA INGAT SANTRI DI RUMAH TAHFIDZ Al-QUR'AN AL-IHSAN PHYSIO SAKTI MAKASSAR= The Effect of Brain Gym on Memory Santri at Tahfidz Al-Qur'an Al-Ihsan Physio Sakti Makassar (Doctoral dissertation, Universitas Hasanuddin).

[6]Nasir, S. N. A., & Halim, H. A. (2023). Aplikasi Buku Cerita Teladan Haiwan Sebagai Sastera Kanak-Kanak Dalam Pemerolehan Bahasa Pertama Murid Attention Deficit Hyperactivity Disorder. Jurnal Pertanika MAHAWANGSA, 10(2), 83-98.

[7]Krejcie, R. V. & Morgan, D. W. (1970). Determine Sample Size for Research Activities. Education and Psychological Measurement . Vol. (30). p607-610.

1. Participants are placed in a classroom setting.

2. Each participant is given one page of the Qur'an to memorize.

3. Participants are allocated 30 minutes to memorize the given page. In the pre-test, both groups use other memorization methods. In the post-test, the control group continues with the same method, while the treatment group uses the al-Qur'an memorization siyaq method. After the 30-minute session, participants undergo a memorization evaluation.

3. NEUROSCIENCE FRAMEWORK RELATED TO MEMORY AND MEMORIZATION

In neuroscience, the process of memorization involves a complex network of the central nervous system working together to store, retain and retrieve information.[8] Memorization is not merely a passive cognitive act, but an active learning process that relies on multiple brain structures and functions. Understanding these neurological foundations is crucial in assessing the effectiveness of the al-Qur'an memorization siyaq method from a scientific perspective.

3.1 Brain Structures Involved in Memory

Several key brain regions play a direct role in memorization:

• **Hippocampus** – Plays a crucial role in the formation of long-term memory and the consolidation of new information. It acts as a "bridge" that converts information from short-term memory into long-term storage.[9]

• **Prefrontal Cortex** – Governs executive functions such as attention, planning, and memorization strategies. This area aids in organizing information and maintaining focus during memorization.[10]

• **Temporal Lobe** – Involved in processing language, semantics, and auditory information. It is essential for recalling Qur'anic verses through verbal repetition and understanding their meanings.[11]

• **Amygdala** – Connects emotions to memory. When memorization is linked to deeper meanings (such as the context and spiritual significance of the verses), the amygdala enhances memory storage.[12]

3.2 Types of Memory in Memorization

Neuroscience categorizes memory into several distinct types:

• Sensorimotor Memory – Utilized during verbal repetition and the movement of the lips during memorization.[13]

• Short-Term Memory – Used to temporarily store information during review and repetition sessions.

• Long-Term Memory – The end goal of successful memorization, particularly involving: Semantic Memory (based on meaning) and Episodic Memory (based on contextual experiences).[14]

The **al-Qur'an memorization siyaq** method specifically enhances semantic memory activation because it involves understanding the continuity and context of verses, rather than purely literal memorization. By emphasizing meaningful connections, the siyaq method leverages the brain's natural inclination for contextual

[8]Mustafa, S. N. M., Johan, S. A., & Ajmain, M. T. (2023). Teori Dan Model Bagi Proses Pengajaran Dan Pembelajaran (PdP) Hifz Al-Quran: Satu Tinjauan Literatur. Asian Journal of Research in Education and Social Sciences, 5(4), 193-208.
[9]Goode, T. D., Tanaka, K. Z., Sahay, A., & McHugh, T. J. (2020). An integrated index: engrams, place cells, and hippocampal memory. Neuron, 107(5), 805-820.
[10] Kolk, S. M., & Rakic, P. (2022). Development of prefrontal cortex. Neuropsychopharmacology, 47(1), 41-57.
[11]Pacheco-Peña, V., & Engheta, N. (2020). Temporal aiming. Light: Science & Applications, 9(1), 129.
[12]Gothard, K. M. (2020). Multidimensional processing in the amygdala. Nature Reviews Neuroscience, 21(10), 565-575.
[13]Wan, C., Cai, P., Wang, M., Qian, Y., Huang, W., & Chen, X. (2020). Artificial sensory memory. Advanced Materials, 32(15), 1902434.
[14]Van Houdt, G., Mosquera, C., & Nápoles, G. (2020). A review on the long short-term memory model. Artificial Intelligence Review, 53(8), 5929-5955.

and meaningful learning, which is supported by neuroscience research on neuroplasticity and memory formation.

4. THE RELATIONSHIP BETWEEN THE AL-QUR'AN MEMORIZATION SIYAQ METHOD AND BRAIN FUNCTION & MEMORY

The al-Qur'an memorization siyaq method offers a holistic approach to memorizing Qur'anic verses by emphasizing contextual continuity, comprehension of meaning, and systematic reactivation of information. This strategy aligns closely with how the brain naturally processes and stores information. This section explains how each step in the siyaq method directly relates to neurological functions involved in the formation of long-term memory.

4.1 Activation of the Hippocampus through Contextual Understanding

The initial steps of the Siyaq method, which involve reading and translating verses in full, stimulate the hippocampus – the primary center for transferring short-term memory into long term memory. When students understand the meaning of the verses rather than memorizing them literally, the hippocampus links new information with prior knowledge, thereby strengthening memory consolidation.

4.2 Stimulation of the Temporal Lobe and Semantic Memory

Identifying keywords and mapping out the continuity of meaning between verses involve semantic processing in the brain's temporal lobe. This stimulates the formation of meaning based memory rather than purely auditory memory. Semantic-based memorization tends to be more durable and easier to recall compared to literal memorization, which is often fragile and easily forgotten.

4.3 Activation of the Prefrontal Cortex through Strategy and Planning

Steps four to seven of the Siyaq method, such as creating mind maps, repetition based on meaning, and visualization, require students to plan, structure, and organize information cognitively. These activities activate the prefrontal cortex – the brain region responsible for executive functions such as focus, information evaluation, and impulse control. Students who actively apply such strategies typically demonstrate stronger memorization retention.

4.4 Neuroplasticity and Strengthening of Synaptic Connections

Through meaningful repetition and periodic reinforcement, the Siyaq method triggers neuroplasticity – the brain's ability to form new neural pathways as a result of active learning. This occurs when students repeatedly understand, relate, and organize the meaning of the memorized verses. Each new exposure to the contextual connections within Qur'anic verses strengthens memory traces within the central nervous system.

8Mustafa, S. N. M., Johan, S. A., & Ajmain, M. T. (2023). Teori Dan Model Bagi Proses Pengajaran Dan Pembelajaran (PdP) Hifz Al-Quran: Satu Tinjauan Literatur. Asian Journal of Research in Education and Social Sciences, 5(4), 193-208.
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4.5 The Role of the Amygdala in Emotional and Spiritual Engagement

It is undeniable that memorizing the Qur'an also carries spiritual and emotional dimensions. When students understand the content of verses contextually (e.g., stories, commands, or prohibitions in the Qur'an), the amygdala becomes involved in linking emotional experiences to the memorized content. This emotional attachment indirectly strengthens memory retention, making memorization more meaningful and enduring.

5. RESEARCH FINDINGS AND NEUROSCIENTIFIC IMPLICATIONS BASED ON T-TEST ANALYSIS

This experimental study involved two groups of university students: the treatment group, which followed the al-Qur'an memorization siyaq method, and the control group, which used conventional memorization techniques. Pre- and post-tests were administered to assess memorization effectiveness after the intervention. A Paired-Sample T-Test was conducted to evaluate differences in memorization performance between the two groups.

Figure 12 Time duration of framing between sketch and digital

Group	Mean (M)	Standard Deviation (Std)	t-value	df	Sig (p)
Control Group	0.93	0.40	2.328	29	0.270
Treatment Group	12.03	0.81	14.802	29	0.001**

Note: *p < 0.05 indicates a statistically significant difference.

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The treatment group showed a significantly higher mean score compared to the control group, with a p-value of 0.001, which is highly significant. This proves that the Siyaq Method has a clear positive impact on students' memorization abilities.

5.2 Neuroscientific Implications of the Results

a) Strengthening of Semantic Memory: The significant score increase in the treatment group indicates that students were not only able to recall better but retained information based on semantic understanding, not just literal memorization. This supports the role of the temporal lobe and hippocampus in meaning processing and long-term memory formation.

b) Validation of Executive Functions in Structured Memorization: Processes such as meaning-based repetition (not just text) and mind-mapping strategies used in the Siyaq Method reflect the active engagement of the prefrontal cortex, which governs planning, focus, and self-regulation – all critical aspects of disciplined memorization.

c) Activation of Neuroplasticity: The structured cognitive training in the Siyaq Method shows that students in the treatment group experienced consistent mental stimulation, which fosters neuroplasticity – the formation of new, enduring synaptic connections that support long-term memory.

d) Emotional and Spiritual Impact on Memorization: The involvement of the amygdala in linking emotion to memorization through contextual understanding of verses helps explain why the treatment group performed better – they were not just memorizing but emotionally and spiritually engaging with the meanings of the Qur'anic verses.[15]

6. CONCLUSION AND RECOMMENDATIONS FOR FUTURE RESEARCH

This study has demonstrated that the al-Qur'an memorization siyaq method significantly enhances memorization performance among university students.

The statistical analysis using the T-Test revealed a marked difference between the treatment and control groups, with the treatment group showing a substantial improvement in memorization abilities. These findings support the theory that context-based understanding and meaningful repetition reinforce long term memory retention.

From a neuroscience perspective, the findings also suggest that activating brain structures such as the hippocampus, prefrontal cortex, temporal lobe, and amygdala during the memorization process is closely tied to the effectiveness of the Siyaq method. By employing strategies such as mind maps, visualization, and contextual repetition, the Siyaq method encourages neuroplasticity, strengthens synaptic connections, and leads to more robust and long-lasting memorization.

While this study provides strong evidence of the Siyaq method's effectiveness, several areas remain open for further research:

- **Neuroimaging Studies** – Using technologies like fMRI (Functional Magnetic Resonance Imaging) to observe brain activity during Qur'an memorization using the Siyaq method. This would provide clearer insight into the specific brain structures involved in understanding and memorization.
- **Influence of Individual Factors** – Future studies could explore the effects of variables such as age, gender, and religious background on the effectiveness of the Siyaq method. This could help identify which groups benefit most from the approach.
- **Integration with Technology** – Developing applications or tools to support the Siyaq Method, such as apps that allow students to link verses with mind maps or visual aids, could be the next step in modernizing its educational implementation.
- **Comparative Studies with Other Methods** – Further research could compare the Siyaq method with other memorization approaches, such as mechanical memorization or game-based learning techniques, to provide a more comprehensive understanding.

In conclusion, the al-Qur'an memorization siyaq method not only offers a more effective approach to facilitating memorization but also has a strong scientific foundation rooted in neuroscience theory. By integrating elements of Islamic education with modern science, this method holds potential as a more comprehensive and impactful way to strengthen Qur'an memorization, especially among university students. This study paves the way for further research in this field and presents a positive impact on Qur'anic memorization practices globally.

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