

Adaptive tahfidz learning based on students' learning styles: A qualitative study at Al-Fattah tutoring center, Pekalongan

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Abstract: This study is motivated by the need for non-formal tahfidz learning that is more adaptive to students' conditions, particularly those experiencing cognitive fatigue after participating in formal school activities. Previous studies on tahfidz have tended to focus on the effectiveness of classical methods in Islamic boarding schools or formal schools; therefore, pedagogical adaptation based on learning styles in the context of tahfidz shadow education remains underexplored. This study aims to describe the process of diagnosing learning readiness, the implementation of adaptive tahfidz based on visual, auditory, and motor-kinesthetic modalities, and its implications for students' learning comfort and memorization stability at Bimbel Al-Fattah Pekalongan. This research employed a qualitative approach with a case study design. Data were obtained from two tutors, two students, and two parents through participatory observation, in-depth interviews, and documentation. The data were then analyzed through data condensation, data display, and conclusion drawing. The findings indicate that adaptive tahfidz begins with a diagnosis of students' physical condition, emotional state, enthusiasm, and learning profiles and is subsequently implemented through color-coded Qur'anic texts, talaqqi, talqin, murottal, and controlled movements. This strategy enhances learning comfort, reduces boredom, minimizes resistance to Qur'anic recitation, and maintains the quality of mutqin memorization. This study concludes that adaptive tahfidz contributes to a neuro-educational pedagogical design that is personal, empathetic, and differentiated for non-formal tahfidz institutions.

Keywords: Adaptive tahfidz, cognitive fatigue, learning styles, neuroeducation

Abstrak: Penelitian ini dilatarbelakangi oleh kebutuhan pembelajaran tahfidz nonformal yang lebih adaptif terhadap kondisi siswa yang mengalami cognitive fatigue setelah mengikuti aktivitas sekolah formal. Kajian tahfidz sebelumnya cenderung berfokus pada efektivitas metode klasik di pesantren atau sekolah formal, sehingga belum banyak menelaah adaptasi pedagogis berbasis gaya belajar dalam konteks shadow education tahfidz. Penelitian ini bertujuan mendeskripsikan proses diagnosis kesiapan belajar, implementasi tahfidz adaptif berbasis modalitas visual, auditori, dan motorik-kinestetik, serta implikasinya terhadap kenyamanan belajar dan stabilitas hafalan siswa di Bimbel Al-Fattah Pekalongan. Penelitian menggunakan pendekatan kualitatif dengan jenis studi kasus. Data diperoleh dari dua tutor, dua siswa, dan dua wali murid melalui observasi partisipatif, wawancara mendalam, dan dokumentasi, kemudian dianalisis melalui kondensasi data, penyajian data, dan penarikan kesimpulan. Temuan menunjukkan bahwa tahfidz adaptif diawali dengan diagnosis fisik, emosional, antusiasme, dan profil belajar siswa, lalu diimplementasikan melalui Al-Qur'an blok warna, talaqqi, talqin, murottal, serta gerak terkontrol. Strategi ini meningkatkan kenyamanan belajar, mengurangi kejenuhan, menekan penolakan mengaji, dan menjaga kualitas hafalan mutqin. Penelitian ini menyimpulkan bahwa tahfidz adaptif berkontribusi sebagai desain pedagogis neuro-edukatif yang personal, empatik, dan diferensiatif bagi lembaga tahfidz nonformal.

Kata kunci: Tahfidz adaptif, kelelahan kognitif, gaya belajar, neuroedukasi

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INTRODUCTION

The paradigm shift in Islamic education in Indonesia should be understood as a transition from teacher-centered instruction, in which teachers are positioned as the

primary authority of knowledge, toward a learning design that views students as active subjects with diverse characteristics, learning rhythms, and educational needs (Santi et al., 2025; Subhan et al., 2026). In the context of Islamic Religious Education, conventional teaching methods often cause learning to be perceived as monotonous (Arifah & Fawait, 2025). By contrast, a Student-Centered Learning approach through the talking stick method has been shown to encourage students' physical, mental, and emotional engagement in asking questions, expressing opinions, and constructing religious meaning in a more participatory manner (Helmy et al., 2023). This shift becomes even more significant when Islamic Religious Education encounters neurodiversity, as inclusive Islamic education requires more than merely adapting learning materials. It also requires the design of realistic learning outcomes, individualized methods, visually adaptive media, and continuous evaluation based on students' profiles (Fitriani et al., 2025). Therefore, flexible approaches such as Teaching at the Right Level can strengthen Student-Centered Learning through instructional differentiation, teacher-parent collaboration, and support from an empathetic learning environment (Irnawati & Ilmiah, 2026).

Memorizing the Qur'an should not be seen as a simple act of *tahfiz* because *tahfiz* requires mental exertion involving receiving, encoding, storing, rehearsing, retrieving and accurate reproduction of desired information. Muthohharoh et al. (2023) explain that Qur'an Memorization Process covers encoding, retention, rehearsal, retrieval and decoding information; hence, it depends on levels of concentration, cognitive styles, and processing. This view supports the argument of Dimyathi et al. (2025), and Dewi et al. (2026), that working memory-based strategies enhance speed and retention of memorized material. Similarly, one could argue that *tahfiz* is a learning activity that demands working memory resources instead of rote learning. In addition to cognitive factors, motivational non-cognitive factors also contribute to the memorization process since effort control, attention, and mood predicted working memory performance of Qur'an Memorization among students (Hurriyati et al., 2022).

The sight of students rushing to tutorial centers or non-formal *tahfiz* institutions after spending the entire day in regular schools presents a pedagogical paradox. The long hours of classes, many subjects to learn, and the cognitive load they entail could potentially overwhelm the psyche of young learners. Darmuji et al. (2024) explain that cognitive overload manifests through loss of concentration, forgetfulness, diminished decision-making abilities and low learning motivation. In these circumstances, a universal and traditional approach to *tahfiz* that does not acknowledge the psychological needs of the learner will appear inadequate, although learning burnout captures a broader scope of physical, emotional, and psychological exhaustion with concomitant loss of motivation (Khomsiah et al., 2024). *Talaqqi* remains an effective way of ensuring proper recitation of the Qur'an. However, when used as a uniform strategy, it becomes monotonous and necessitates classifying students according to their memorization abilities (Utami & Maharani, 2018). Indeed, a uniform rate of memorization can cause academic and emotional exhaustion and create negative attitudes towards the Qur'an.

The concept of neuro-education according to the tripartite model of visual, auditory, and motor-kinesthetic (VAK) learning channels should not be viewed as a fixed categorization where every student excels through a particular pathway, since empirical evidence supporting compatibility remains limited. (Pashler et al., 2008). However, VAK can

still be used pedagogically as a principle of multisensory learning: Qur'anic verses may be visualized through colors or mushaf patterns, presented auditorily through murattal or talaqqi, and reinforced through rhythmic movement or bodily gestures. This type of multisensory approach can help distribute information across multiple processing channels, thereby making cognitive load more manageable and enabling short-term memory to form long-term representations more effectively (Al Adzillina & Hasanah, 2021; Shams & Seitz, 2008). In the context of tahfiz, a safe, non-threatening, and low-pressure learning atmosphere is essential because stress can disrupt memory retrieval and shift learning into a more rigid and defensive mode (Vogel & Schwabe, 2016). When students feel relaxed, active, and meaningfully engaged, the learning environment becomes more conducive to synaptic plasticity associated with BDNF and memory retention (Miranda et al., 2019).

Previous studies on tahfiz had three dominant trends, namely: quantitatively assessing the effectiveness of memorization methods, investigating the practice of tahfiz in Islamic boarding schools or within the scope of formal schools, and describing generically applicable methods such as muraja'ah, tasmi', and talaqqi as memorization enhancement strategies. Those trends were significant; however, they were insufficient in addressing the practice of tahfiz in shadow education institutions, such as tutoring centers, where students attend after accomplishing formal school activities while being fatigued cognitively. In this regard, the originality of this study is dedicated to adaptive tahfiz learning at Bimbel Al-Fattah Pekalongan, which does not only conceptualize memorization methods quantitatively but also qualitatively as pedagogical response strategies to post-school cognitive fatigue. This study considers individual visual, auditory, and motor-kinesthetic learning types as the underlying rationale for methodological adaptability, not as mere variations. In this way, this study contributes to the originality and authenticity of tahfiz studies in the educational field.

This study attempts to describe the first diagnostic process conducted by tutors in determining students' readiness for learning before the tahfiz activities start, primarily when they come from formal school activities. This diagnostic process involves identifying the symptoms of cognitive fatigue, including the decrement of concentration, boredom, tired facial expressions, and preferences for visual, auditory, and motor-kinesthetic learning types. In addition, this study also tries to investigate the implementation of adaptive tahfiz based on the learning types using visual-assisted media, talaqqi and murattal reinforcement, and kinesthetic activities. In addition to describing these pedagogical processes, this study also analyzes their implications for mitigating academic burnout, improving psychological comfort, and optimizing memorization retention. Thus, this study is directed toward demonstrating how shadow education institutions can design tahfiz learning that is more personalized, empathetic, and effective in maintaining the quality of students' Qur'anic memorization.

RESEARCH METHOD

According to Sugiyono (2017), qualitative research is used to understand social phenomena in depth, naturally, and meaningfully within their specific contexts. This study employed a qualitative design with a case study approach because it sought to reveal the process of adaptive tahfidz instruction based on students' learning styles at Bimbel Al-

Fattah Pekalongan. The research site was selected because this institution represents a non-formal educational setting that accommodates students with diverse learning conditions after they have completed their formal school activities. The research subjects were selected through purposive sampling, consisting of two teachers/tutors, two students, and two parents or guardians who had direct experience with the learning diagnosis process, the implementation of tahfidz instruction, and the development of students' memorization. Data were collected through participant observation of instructional interactions, in-depth interviews to explore pedagogical strategies and psychological experiences, and documentation in the form of photographs, memorization progress notes, and the learning media used.

According to Miles et al. (2020), qualitative data analysis is made through interactive data condensation, data display, and conclusion drawing. The collected data were reduced by choosing the relevant information about cognitive fatigue, learning styles, and adaptive tahfidz strategies and were displayed descriptively in the form of narrative themes related to the focus of the research. The trustworthiness of the data was achieved through source triangulation and technique triangulation, which was done by comparing the information collected from teachers, students, and parents or guardians and the information gathered via observations and documentation. Finally, the conclusion was drawn based on the patterns identified about the adaptation of tahfidz instructions related to students' learning styles at Bimbel Al-Fattah Pekalongan

RESULTS AND DISCUSSION

Diagnosing cognitive readiness: Identifying cognitive fatigue in shadow education settings

Some of the student's responses show that not all of them are in good condition mentally to absorb any new material for memorization because some of them have been studying from the morning until noon. The sign of them being tired can be seen from their sleepy facial expression, low energy, slow processing of the lesson, and they needed a brief pause before starting to submit their recitation. Teacher 1 said:

“Usually, I first observe the child’s face; if they appear tired, I talk with them for a while before starting the memorization session.”

This statement implies that the tahfidz process in a shadow education setting cannot be equated with the learning process at the beginning of the day, because students arrive with the aftereffects of their previous academic activities. In this regard, the teacher's preliminary diagnosis is not a matter of casual practice, but a pedagogical consideration for assessing the students' physical, emotional, and mental status prior to deciding on the memorization guidance. This finding aligns with the explanation of Darmuji et al. (2024) regarding the manifestation of cognitive fatigue through difficulties in focusing, forgetfulness, lack of motivation, and impaired learning capabilities.

From an interpretive view, the teacher's practice of reading students' facial expressions, body language, and emotional reaction in the opening phase of the learning process reflects his shift from the memorization-target to the learning-readiness-based perspective. This approach does not compel the students to be the object of submission of the recitation memorization requirement; instead, the teacher checks if their psychological

state is suitable for receiving a new load of information to be committed to memory. Under the pressure of the heightened cognitive loading capacity derived from the formal education context, the imposition of the memorization requirement can trigger psychological tension, demotivation, and resistance to the Qur'anic recitation practice. Hence, the light conversation prior to the tahfidz learning serves as a transition strategy lowering the students' psychological barriers to learning. In that respect, the observed approach supports the claim regarding the interplay between cognitive fatigue and psychological health (Madigan et al., 2024; Tang et al., 2021) in the process of memorizing the Qur'an. Therefore, diagnosing the students' cognitive readiness can be deemed as a promising strategy to mitigate the risks of imposed, uncompromising memorization practices that can lead to academic burnout.

The obtained results can be analyzed through the prisms of readiness to learn, diagnostic assessment, and student-centered learning. The law of readiness postulates that the learning event is more likely to be successful if the learner is in the state of readiness to learn, whereas the state of unpreparedness is more likely to result in the teaching-learning process being stressful for the students (Pratama, 2019). As such, the opening conversation observed in the Bimbel Al-Fattah context reflects the teacher's compliance with the law of readiness as she was postponing, mitigating, and adapting the memorization loading requirement to the students' psychological state. Similarly, the practice aligns with the concept of cognitive and non-cognitive diagnostic assessment as an integral part of the educational process, which calls for diagnosing the students' learning readiness, barriers, and needs to adjust the educational strategies accordingly (Febrianti & Nisa, 2025). In the Student-Centered Learning framework, such an opening conversation is a prime example of placing students at the center of the educational process, while teachers play the role of learning enablers and regulators (Awwaliyah & Fatimah, 2024; Latjompoh et al., 2025). Thus, diagnosing the students' cognitive fatigue in the shadow education context emerges as an innovative strategy to optimize the memorization-based Qur'an learning process as it entails the dynamic of readiness to learn, psychological preconditions, and the teacher's responsive adaption to the students' needs.

Multisensory pedagogical adaptation: Reorienting classical tahfidz methods

Observational data show that the adaptation of multisensory pedagogy at Bimbel Al-Fattah was implemented by integrating visual media and auditory strategies into the tahfidz process. For students with visual learning tendencies, the teacher used a color-coded Qur'an so that segments of verses were not merely recognized as sequences of text, but also as visual patterns that helped students identify the order, position, and boundaries of their memorization. Student 1 stated:

"I find it easier to memorize by looking at the Quran, especially the verses and their colors. I find that color helps me remember what I'm memorizing. I remember the order of the colors, for example, after pink, then green. So, when I see those colors, it's easier to remember the verses I need to memorize."

Meanwhile, for auditory learners, the teacher continued to maintain the methods of talaqqi, talqin, clear articulation of letters, and murottal support so that students could gradually perceive the sound, rhythm, and accuracy of recitation. Student 2 stated:

"I memorize it more easily if I listen to the teacher read the verse first. After that, I follow along while looking at the Quran. If the verse is new, the teacher reads it slowly and repeats it until I have it memorized. Once I have it memorized, I can recite it myself."

These findings indicate that classical tahfidz methods were not abandoned, but rather reoriented to become more flexible in relation to students' information-processing pathways. The talaqqi method improves student achievement through direct teacher-student interaction, individualized guidance, immediate feedback, and repeated recitation of Qur'anic verses, thereby enhancing comprehension, memorization, learning motivation, and teacher-student relationships (Rizki et al., 2023). Talaqqi continues to hold significant value in maintaining recitation accuracy and close teacher guidance; however, its use needs to be adjusted so that it does not turn into a rigid, single instructional pattern that risks causing boredom (Utami & Maharani, 2018). In this context, the use of the color-coded Qur'an and auditory reinforcement demonstrates that adaptive tahfidz works by expanding students' access to learning, so that memorization is supported not only by verbal repetition, but also by visual mapping, auditory experience, and psychological comfort during the Qur'anic learning process.



a. The use of color coded Qur'anic texts as visual media



b. Talaqqi practice as an auditory strategy

Fig. 1. Adaptive tahfidz learning

In addition to visual and audio, data also reveal that kinesthetic students have better focus with the provision of space for them to move around in little ways such as doing the right things at the right time, squeezing, or repeating verses with a particular body rhythm. This is significant because bodily movement in tahfidz learning is often viewed as a symptom of un-focussed or undisciplined behavior whereas in the case of kinesthetic learners movement actually becomes a means of regulating attention. By directing movement in proportion, students' bodies become a helpful medium in sustaining focus, easing tension, and strengthening memorization rehearsal. This view is congruent with the notion that the memorization process consists of encoding, retention, rehearsal, retrieval, and decoding. Thus, the memorization quality is not only dependent on the frequency of

repetition, but also on how students receive and recall the information (Muthohharoh et al., 2023). From the perspective of procedural memory, repetition involving motor patterns can support the formation of more automatic cognitive routines. Accordingly, controlled movement can be understood as part of a strategy for strengthening memorization, rather than as a deviation from the adab of Qur'anic learning (Magallón et al., 2016).



Fig. 2. Controlled motor kinesthetic activities in the process of memorizing the Qur'an

Theoretically, visual, auditory, and motor-kinesthetic adaptation in tahfidz learning at Bimbel Al-Fattah should not be understood as a rigid justification of learning styles claims, as scientific evidence for the deterministic matching of learning styles remains weak (Clinton-Lisell & Litzinger, 2024; Pashler et al., 2008). Rather, VAK in this study is more appropriately positioned as a principle of multisensory pedagogy that helps teachers open multiple stimulus pathways, enabling students to receive, process, and rehearse memorization through more diverse learning channels. The multisensory approach is relevant because the brain naturally integrates information from various modalities; therefore, learning that involves vision, hearing, and movement can enrich memory representation (Shams & Seitz, 2008). Within the framework of information processing, this strategy allows Qur'anic verses to be processed more purposefully through attention, retention, rehearsal, and retrieval (Zulfah & Mukhoiyaroh, 2022). This finding also intersects with working memory strategies in tahfidz, as distributing stimuli across multiple channels can help reduce the accumulation of cognitive load within a single processing pathway (Dimyathi et al., 2025). Thus, the reorientation of classical tahfidz methods in this study does not mean replacing talaqqi, talqin, or muraja'ah, but rather situating them within a pedagogical design that is more adaptive, multisensory, and responsive to students' cognitive conditions in the context of shadow education.

Neuroeducational implications: Mitigating burnout and stabilizing memory retention (mutqin)

Interview data from parents indicate that adaptive tahfidz instruction at Bimbel Al-Fattah has an impact not only on the fluency of students' recitation submissions but also on changes in their learning emotions. Parent 1 stated:

“My child no longer refuses or has tantrums when asked to recite the Qur’an; instead, at home, my child has begun to engage in muraja’ah independently.”

Parent 2 also emphasized:

“My child is more enthusiastic about attending the tutoring sessions, does not feel bored, and the atmosphere of reviewing memorization at home has become more pleasant.”

These statements demonstrate that adaptive strategies function as a psychological buffer for students who were previously at risk of developing resistance to tahfidz activities due to the layered learning demands of formal schooling and nonformal tutoring. Pedagogically, the reduction of tantrums, refusal to recite the Qur’an, and boredom indicates that adaptive tahfidz can transform the memorization experience from a pressuring activity into a learning process that is safer, more personal, and emotionally acceptable. The learning burnout includes physical, emotional, and cognitive fatigue, as well as decreased motivation (Abdullah et al., 2021; Aulia et al., 2026; Supriyadi et al., 2026); therefore, more empathetic instructional strategies are essential for mitigating the risk of academic burnout.

The neuro-educational undercurrents of these findings are manifested in how teachers can establish a non-threatening and non-coercive learning environment that accommodates the emotional conditions and learning approaches of students. When learners feel at ease, appreciated, and not pressured to attain homogenous memorization benchmarks, the processes of attention and verse repetition become more stabilized. Contrariwise, when tahfidz is performed in a stressful, rigid, and coercive environment, students risk experiencing attentional and retrieval difficulties for the previously memorized verses. Vogel and Schwabe (2016) highlight that stress impairs learning and memory processes, specifically when the former’s pressure accelerates the latter’s defensive mechanisms. In Bimbel Al-Fattah’s context, the emotional comfort fostered by positive teacher-student relationships, flexible approaches, and empathetic acknowledgment of fatigue becomes a critical equalizer in mitigating the affective burden of tahfidz. Similarly, Alexander et al. (2021), explain that positive emotions are intrinsically linked with neural networks and cognitive processes that underpin happiness and well-being. Hence, well-being ceases to be an ancillary component in the memorization of Qur’an and becomes a neuro-educational determinant that predisposes students to memorizing in a more relaxed, prepared, and receptive mental space.

The stabilized mutqin retention in this study is not only explained by the presence of intensive and extensive muraja’ah practices but also by the harmony between students’ psychological dispositions, multisensory didactics, and the aforementioned supportive atmosphere. The documentation of recitation progressions indicates that learners are able to consistently uphold their memorization levels when the tahfidz act of retention is performed in an adaptive and non-intimidating setting. Cognitively, the memorization of Qur’an engages the reciters in the processes of encoding, retention, rehearsal, retrieval, and decoding (Muthohharoh et al., 2023). Hence, the stability of mutqin in this study is not only predicated on the presence of extensive practice but also on the cognitive and emotional readiness cultivated by a conducive environment. Dimyathi et al. (2025), indicate that working memory-based strategies enhance the speed and retention capacity of

memorization. Likewise, at the neurobiological level, BDNF exerts its influence on memory consolidation through its roles in synaptic plasticity and memory formation, specifically in the hippocampal system (Miranda et al., 2019). Therefore, an empathetic, relaxed, and multisensory learning space can be conceptualized as a memory retention ecosystem that optimizes the cognitive and neurobiological processes of students. Hence, this study's primary contribution lies in its ability to demonstrate how mutqin stability within the shadow education system is not only explained by the intensive and extensive recitation practices but also enhanced by neuro-educational interventions that prevent burnout and optimize the learners' memory systems.

CONCLUSION

This study proves that adaptive tahfidz learning in Bimbel Al-Fattah Pekalongan is the learning design that analyzes the students' cognitive, emotional, and physical readiness after attending the formal school activities. The initial analysis of symptoms of cognitive fatigue becomes the standard for the teachers to provide more appropriate memory building strategy than standardized recitation targets. The adaptation of tahfidz learning involves colored Qur'an text for visual types of learners, talaqqi, talqin, and murottal for audio types, and body movements for kinesthetic types of the students. The study findings have revealed that the classical methods of tahfidz do not need to be rejected, but they need to be adjusted to personal contexts and the type of information processing of the students.

In a neuro-educational context, this study has shown that adaptive tahfidz learning design has a positive effect on the comfort of learning, elimination of boredom while learning, absence of Qur'an recitation resistance, and more high-quality mutqin outcomes. The quality of the memory is not defined by the frequency of muraja'ah but by creating a safe, empathic, non-judgmental learning space that corresponds to the students' psychological needs. Hence, the significant contribution of this study is to prove that shadow education institutions should correspond to neuro-educational realities rather than rely on the same educational methods and ignore the psychological needs of the learners. This study has recommended that non-formal tahfidz institutions introduce learner-centered, multisensory, and differentiated learning interventions. The future study can employ a mixed method or quasi-experimental research design to explore the effectiveness of the adaptive tahfidz learning design in more details.

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