

The Convergence of Neuroscience and the Concept of "Tazkiyatun Nafs" in the Perspective of Islamic Education: A Systematic Literature Review for the Development of Affective Learning Models

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Article Info	ABSTRAK
Article History: Received 20-05-2025 Revised 09-06-2025 Accepted 21-06-2025 Keywords: Neuroscience Tazkiyatun Nafs, Islamic Education, Affective Learning, Systematic Literature Review, Copyright © 2025, The Author(s). This is an open access article under the CC-BY-SA license 	Penelitian ini bertujuan untuk mengkaji secara sistematis konvergensi antara neurosains modern dan konsep tradisional "Tazkiyatun Nafs" (penyucian jiwa) dalam perspektif pendidikan Islam, dengan fokus pada pengembangan model pembelajaran afektif. Melalui pendekatan kajian literatur sistematis, penelitian ini menganalisis literatur ilmiah dari kedua bidang neurosains kognitif dan pendidikan Islam untuk mengidentifikasi titik temu konseptual dan implikasi praktisnya bagi pembentukan karakter dan emosi positif peserta didik. Hasil kajian menunjukkan bahwa prinsip-prinsip Tazkiyatun Nafs, seperti kontrol diri, empati, dan kesadaran spiritual, menemukan landasan ilmiah dalam temuan neurosains mengenai plastisitas otak, regulasi emosi, dan peran jalur saraf dalam pembentukan kebiasaan. Konvergensi ini membuka peluang untuk merancang model pembelajaran afektif dalam pendidikan Islam yang tidak hanya berlandaskan nilai-nilai spiritual, tetapi juga didukung oleh pemahaman ilmiah tentang fungsi otak. Model yang diusulkan menekankan integrasi praktik spiritual, refleksi diri, dan strategi kognitif-behavioral untuk mengembangkan kecerdasan emosional dan spiritual peserta didik. Implikasi penelitian ini menyoroti pentingnya pendekatan interdisipliner dalam pendidikan Islam untuk menciptakan lingkungan belajar yang holistik, efektif, dan relevan dengan tantangan kontemporer. ABSTRACT <i>This research systematically investigates the convergence between modern neuroscience and the traditional concept of Tazkiyatun Nafs (purification of the soul) within the perspective of Islamic education, focusing on the development of an affective learning model. Employing a systematic literature review approach, this study analyzes scholarly literature from both cognitive neuroscience and Islamic education to identify conceptual commonalities and their practical implications for fostering character and positive emotions in learners. The findings indicate that the principles of Tazkiyatun Nafs, such as self-control, empathy, and spiritual awareness, find scientific grounding in neuroscientific discoveries concerning brain plasticity, emotion regulation, and the role of neural pathways in habit formation. This convergence reveals opportunities to design affective learning models in Islamic education that are not only rooted in spiritual values but also supported by a scientific understanding of brain function. The proposed model emphasizes the integration of spiritual practices, self-reflection, and cognitive-behavioral strategies to develop learners' emotional and spiritual intelligence. The implications of this research highlight the importance of an interdisciplinary approach in Islamic education to create a holistic, effective, and relevant learning environment for contemporary challenges.</i>

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INTRODUCTION

Education, in its essence, aims not only to transfer knowledge (cognitive) and skills (psychomotor), but also to shape the character, morals, and emotions of individuals (affective). In the context of Islamic education, this affective dimension becomes very crucial, rooted in the fundamental concept of "Tazkiyatun Nafs" or purification of the soul. Tazkiyatun Nafs is a continuous internal process to cleanse the soul of despicable qualities and adorn it with praiseworthy qualities, which ultimately leads to moral perfection

and closeness to God (Hanum & Fakhr, 2021). This concept has long been a major pillar in Islamic education, emphasizing the importance of spiritual and moral development as the foundation for all aspects of life.

As science advances, modern neuroscience has provided a deep understanding of how the brain works, including cognitive, emotional, and behavioral processes. Discoveries in neuroscience, such as neuroplasticity (the brain's ability to change and adapt), the role of the prefrontal cortex in emotion regulation and decision-making, and reward systems in the brain, offer new perspectives on understanding the biological mechanisms behind character and behavior formation (Davidson, 2012; Khadijah, 2024). The integration between neuroscience and education has given birth to a new field known as educational neuroscience, which seeks to optimize the teaching and learning process by considering how the brain works (Suyadi, 2022).

Although neuroscience and Islamic education come from different paradigms, there is significant potential for convergence between the two, especially in the development of the affective domain. The concept of Tazkiyatun Nafs, which intrinsically involves internal transformation and the formation of good habits, may have neurobiological correlations that can be explained through the lens of neuroscience. For example, worship practices in Islam such as prayer, dhikr, and fasting, which are an integral part of Tazkiyatun Nafs, have been studied to have a positive impact on brain structure and function, including improved emotional regulation and stress reduction (Huda et al., 2023).

However, despite some efforts to integrate neuroscience in Islamic education in general (Suyadi, 2022; Suyadi et al., 2024), systematic literature review that specifically highlights the convergence between neuroscience and the concept of Tazkiyatun Nafs for the development of affective learning models is still limited. Most research focuses on the integration of neuroscience in cognitive or general learning, without explicitly linking it to the philosophical and practical richness of Tazkiyatun Nafs in shaping the affective dimension of learners.

Therefore, this study aims to bridge this gap by conducting a systematic literature review. The main research questions to be answered are: (1) How can the concept of Tazkiyatun Nafs be understood through the lens of modern neuroscience? (2) What are the implications of the convergence between neuroscience and Tazkiyatun Nafs for the development of affective learning models in Islamic education? (3) How can this convergence-based affective learning model be conceptually formulated? It is hoped that the results of this research will provide a strong and innovative framework to improve the quality of Islamic education, especially in the development of character and emotional-spiritual intelligence of students, which is relevant to the needs of the times.

RESEARCH METHODS

This study uses a systematic literature review (SLR) approach. This method was chosen to identify, evaluate, and synthesize all available relevant evidence regarding the convergence of neuroscience and Tazkiyatun Nafs in the perspective of Islamic education, particularly as it relates to affective learning. The SLR process follows systematic and transparent stages to reduce bias and ensure the reliability of the findings.

Literature search strategies are carried out on leading scientific databases such as Google Scholar, Scopus, Web of Science, ScienceDirect, and leading Islamic educational journals that can be accessed online. The search keywords used included a combination of: "neuroscience", "tazkiyatun nafs", "Islamic education", "affective learning", "Islamic character education", "neuroplasticity", "Islamic emotion regulation", "spiritual intelligence neuroscience", "Islamic brain and heart", and "integration of Islamic educational neuroscience". Publication limits are set in the last 7 years (January 2018 - June 2025) to ensure the relevance and timeliness of the source.

The inclusion criteria for articles and books are publications that discuss neuroscience, Tazkiyatun Nafs, Islamic education, or a combination of the three, as well as explicitly discuss the implications of neuroscience on affective learning processes or character formation in the context of Islamic education. Articles must be available in Indonesian or English and published between January 2018 and June 2025. On the other hand, exclusion criteria include publications that are not relevant to the topic, non-scientific articles (e.g., news, blogs, opinions without scientific basis), duplication of articles, as well as articles that only discuss neuroscience or Tazkiyatun Nafs in general with no connection to education or Islam.

The selection process is carried out in three stages. The first stage is identification, where the initial search uses keywords to identify a large number of articles. Second, screening, involves a careful

examination of the identified article titles and abstracts to determine their relevance to the inclusion criteria, and clearly irrelevant articles will be removed. The final stage is eligibility, where articles that pass the screening stage will be downloaded and read in full to ensure their suitability for the research objectives.

The data extracted from each article included author, year of publication, title, research objectives, methodology, key findings, and its relevance to the convergence of neuroscience-Tazkiyatun Nafs in affective learning. Data analysis was carried out narratively and thematically. The extracted data will be synthesized to identify patterns, themes, and relationships between concepts. This analysis will focus on understanding the concept of Tazkiyatun Nafs from various perspectives in Islamic literature, identification of key findings in neuroscience relevant to affective aspects and character formation, exploration of the points of convergence between Tazkiyatun Nafs and neuroscience, drawing practical implications of this convergence for the development of affective learning models in Islamic education, as well as the formulation of the concept of an integrated affective learning model both perspectives.

RESULTS AND DISCUSSION

Result

This systematic literature review managed to identify a number of relevant articles and books, which partially or directly discuss the relationship between neuroscience, Tazkiyatun Nafs, and Islamic education, especially in an affective context. The findings are grouped into three main parts: (3.1) Neuroscience Understanding of Affective Aspects and Character Formation, (3.2) The Concept of Tazkiyatun Nafs in Islamic Education, and (3.3) Convergence Points between Neuroscience and Tazkiyatun Nafs.

1. Neuroscience Understanding of Affective Aspects and Character Formation

Modern neuroscience has revolutionized our understanding of how emotions, behaviors, and character are formed in the brain. Some key findings relevant to the affective realm include:

- **Neuroplasticity:** The brain is not a static organ, but rather highly plastic and is able to change its structure and function in response to lifelong experiences and learning (Davidson, 2012; Khadijah, 2024). This means that habits, mindsets, and emotional responses can be shaped and changed through targeted practice and environment. This concept is fundamental in character building, showing that good morals can be "trained" and "instilled" through repeated experiences.
- **Prefrontal cortex (PFC):** PFCs, specifically the dorsolateral prefrontal cortex (dlPFC) and ventromedial prefrontal cortex (vmPFC), play important roles in executive function, including planning, decision-making, impulse control, emotion regulation, and social interaction (Purcell & Davidson, 2018). Activities at PFCs allow individuals to put aside instant urges in favor of long-term goals, a crucial ability in moral and ethical formation. Damage to PFCs can lead to significant changes in personality, such as impulsivity and lack of empathy (Schaefer et al., 2019).
- **Limbic System:** The limbic system, which includes the amygdala and hippocampus, plays a central role in emotion processing, memory, and motivation. The amygdala is responsible for emotional responses such as fear and anger, while the hippocampus is important for learning and long-term memory formation, including emotional memory (LeDoux, 2019). Healthy emotion regulation involves a balanced interaction between the limbic system and the PFC.
- **Brain Reward System :** The nucleus accumbens, part of the brain's reward system, is associated with motivation, pleasure, and the release of dopamine. This system is involved in habit formation, both positive and negative. Understanding how these systems work can be helpful in designing interventions that reinforce positive behaviors through intrinsic "rewards" (Berridge & Kringelbach, 2015).
- **Social Neuroscience and Empathy:** Social neuroscience research shows that empathy involves complex neural networks, including *mirror neurons*, that allow individuals to understand and feel the emotions of others (Decety & Jackson, 2004). The development of empathy is essential for prosocial behavior and the formation of a harmonious society.
- **Impact of Spiritual Practices:** Several studies have shown that practices such as meditation and dhikr can have a positive impact on the brain. Meditation can increase the thickness of the cortex in areas associated with attention and sensory processing, as well as reduce amygdala activity (Tang et al., 2015). Zikir has been shown to lower stress levels, reduce anxiety, improve concentration, improve sleep quality, and build positive emotions through a decrease in the hormone cortisol and an increase in serotonin (Huda et al., 2023; Yuniarti et al., 2021). This suggests that spiritual practices can neurobiologically support emotional regulation and mental well-being.

2. The Concept of "Tazkiyatun Nafs" in the Perspective of Islamic Education

Tazkiyatun Nafs is the core of Islamic education, which aims to cleanse the heart and soul of spiritual impurities (bad qualities) and decorate them with virtues (noble qualities) in order to achieve closeness to Allah SWT and true happiness (Afiani, 2022; Basuki, 2021; Hanum & Fakhr, 2021). These concepts include the cognitive dimensions (understanding of good and bad), affective (feelings and attitudes towards good and bad), and psychomotor (behaviors that reflect goodness).

The main principles of Tazkiyatun Nafs include muhasabah (self-introspection), which is regular self-reflection to evaluate actions, thoughts, and intentions, which involves deep self-awareness and recognition of shortcomings (Hanum & Fakhr, 2021). Furthermore, mujahadah (self-struggle) is a sincere effort to fight lust and negative impulses, requiring self-control, discipline, and resilience (Afiani, 2022). Riyadhah (spiritual practice) includes worship practices such as prayer, fasting, dhikr, reading the Qur'an, and almsgiving, which aim to strengthen spirituality and cleanse the heart (Afiani, 2022). Muraqabah (self-supervision by Allah) is the awareness that Allah SWT always supervises every action, which encourages individuals to always do good and stay away from evil (Yuniarti et al., 2021). Tafakur (contemplation) means thinking deeply about God's creation and the meaning of life, which can increase spiritual awareness and gratitude (Yuniarti et al., 2021). The ultimate goal of Tazkiyatun Nafs is the realization of moral karimah, which is noble morals such as patience, gratitude, empathy, honesty, justice, and compassion (Hanum & Fakhr, 2021), which is not just a theory, but becomes an inherent behavior without coercion.

In Islamic education, Tazkiyatun Nafs is implemented through various methods, ranging from instilling values from an early age, habituating worship practices, to Sufistic counseling guidance (Afiani, 2022; Hanum & Fakhr, 2021). The main goal is to form individuals who are intellectually, emotionally, and spiritually intelligent (Suyadi, 2022).

3. The Point of Convergence between Neuroscience and Tazkiyatun Nafs

Analysis of the literature reveals significant points of convergence between the principles of Tazkiyatun Nafs and the findings of neuroscience, suggesting that Islamic spiritual teachings have a neurobiological underpinning:

- **Neuroplasticity and Mujahadah/Riyadah:** The concept of neuroplasticity (Davidson, 2012; Khadijah, 2024) is very much in line with the principles of Mujahadah and Riyadhah in Tazkiyatun Nafs. Repeated efforts to fight lust (Mujahadah) and perform worship (Riyadah) consistently can form and strengthen nerve pathways in the brain that support positive behavior. For example, repetitive patient training will strengthen the neural connections associated with emotion regulation and impulse control in PFCs, making them more automated responses. This is in line with the view that consciously designed worship and spiritual practices can utilize neuroplasticity to shape mindsets and behaviors (Syafii & Purnomo, 2023).
- **Prefrontal Cortex and Self-Control/Decision Making:** The function of PFCs in impulse control, planning, and decision-making (Purcell & Davidson, 2018) is directly relevant to aspects of self-control (mujahadah) and the ability to choose between good and evil in Tazkiyatun Nafs. Islamic education that encourages individuals to think before acting, consider consequences, and make decisions in accordance with religious values, indirectly trains the function of the PFC. The ability to "hold anger" advocated in Islam (Jonedu, 2022) can be explained as a result of the activation and strengthening of the emotion regulation pathway in the PFC.
- **Limbic System and Emotion Regulation/Lust Management:** Emotion management in the limbic system has parallels with the concept of Tazkiyatun Nafs which seeks to cleanse the soul from negative emotions such as anger, envy, and resentment, as well as cultivate positive emotions such as gratitude and love. Islamic practices of dhikr and meditation have been proven to reduce stress and anxiety and increase calmness (Huda et al., 2023; Yuniarti et al., 2021) can be explained neurobiologically through its impact on the activity of the amygdala and the parasympathetic nervous system. This suggests that Tazkiyatun Nafs provides a framework for practicing emotion regulation at a neurological level.
- **Mirror Neurons and Empathy/Ukhuwah:** Neuroscientific findings about mirror neurons that underlie empathy (Decety & Jackson, 2004) are very much in line with Islam's emphasis on ukhuwah

(brotherhood) and concern for others. The concept of "uswatun hasanah" (good example) in Islamic education, when practiced consistently, can strengthen the connections of neural circuits, including mirror neurons, thereby fostering empathy and inherent prosocial behavior.

- **The Impact of Worship on Brain Function:** Various forms of worship in Islam, such as prayer, dhikr, and reciting the Qur'an, involve regular cognitive and emotional activity. Prayer movements, for example, involve motor coordination and concentration. Dhikr with the repetition of holy words can induce a calm and focused state of mind, similar to the meditation effect, which in turn can improve brain connectivity and reduce stress (Huda et al., 2023; Yuniarti et al., 2021). Fasting trains self-control and discipline, which involves the activation of PFCs.
- **Concept of Heart (Qalb) and Brain:** In Islam, the heart (qalb) is often referred to as the center of understanding, emotions, and spirituality, not just a physical organ (Al-Ghazali, 2009). While neuroscience focuses on the brain as the center of mental activity. Some literature tries to bridge this by interpreting qalb as a spiritual intelligence that bridges religion and spirituality, interacting with brain functions (Badri, 2015). Or, that the brain and qalb functionally have similarities, where qalb is the king of the body and becomes a means of faith. This shows that the concept of qalb in Islam can be seen as a holistic representation of the highest functions of the brain related to consciousness, morality, and spirituality.

Discussion

The convergence between neuroscience and Tazkiyatun Nafs offers a strong and innovative perspective for developing Islamic education, particularly in the formation of the affective realm. This discussion will explore the implications of this convergence and formulate a prospective affective learning model.

1. Implications of the Convergence of Neuroscience and Tazkiyatun Nafs for Affective Learning

Understanding the intersection between neuroscience and Tazkiyatun Nafs provides some important implications for the development of affective learning models in Islamic education. First, this convergence allows for the development of scientific- and spiritual-based character education that is not only based on religious values, but is also reinforced by a scientific understanding of how character is formed in the brain. This can increase the effectiveness of character education programs because they are designed based on the most optimal brain working principles (Suyadi et al., 2024). For example, repetition and consistency in the habit of good morals, as recommended in Tazkiyatun Nafs, can be understood as a form of neuroplasticity training to strengthen the desired neural pathways (Khadijah, 2024).

Second, Islamic teachings on patience, restraint of anger, and managing lust (Jonedu, 2022) can be translated into effective and consciously trained emotion regulation strategies. With a neuroscientific understanding of the role of PFCs and the limbic system, students can be taught techniques of self-reflection (muhasabah) and relaxation (e.g. through dhikr) to manage emotions more effectively, so that negative emotional responses can be minimized and replaced with constructive responses (Huda et al., 2023).

Third, by understanding the mechanisms of mirror neurons, Islamic education can design activities that actively promote empathy and social intelligence, such as case studies on the suffering of others, community service projects, and habituation of prosocial behavior. The emphasis on ukhuwah (brotherhood) in Islam can be strengthened by exercises that neurobiologically activate brain areas associated with empathy and care (Decety & Jackson, 2004).

Fourth, understanding how the brain reward system works can be used to increase students' intrinsic motivation in carrying out religious commands and having noble character. Teachers can create learning environments that provide non-material "rewards," such as sincere praise, recognition of effort, or positive experiences of doing good, which can trigger the release of dopamine and reinforce positive behaviors (Berridge & Kringelbach, 2015).

Finally, this convergence allows Islamic education to move beyond the dichotomy between ratio and spirituality, or between the brain and the heart, towards holistic learning that integrates the brain, heart, and spirit. This encourages an approach that recognizes that spiritual, emotional, and cognitive functions are inextricably intertwined in the work of the brain and soul. This means that education not only hone intellectual intelligence, but also emotional and spiritual intelligence in an integrated manner (Suyadi, 2022).

2. Development of Affective Learning Model Based on the Convergence of Neuroscience and Tazkiyatun Nafs

Based on the above implications, an affective learning model can be developed by integrating the principles of neuroscience and Tazkiyatun Nafs. This model will be centered on active, reflective, and transformative learning experiences, which we name the Neuro-Tazkiyah Affective Learning Model (MPANT).

The basic principles of MPANT include being student-centered by realizing the uniqueness of each individual's brain development and its plasticity potential, holistic integration that integrates cognitive, affective, and spiritual aspects in its entirety, learning through hands-on experience followed by deep reflection (muhasabah), consistent habituation that utilizes neuroplasticity through repetitive practice (riyadhah), and the creation of a supportive environment with a safe classroom atmosphere. positive, and stimulates emotional development. The MPANT Model components are designed in the following four interactive phases:

- **Self-Awareness Phase (Muhasabah & Neuroscience Awareness):** Aims to build students' self-awareness of their emotions, thoughts, and behaviors, as well as understand the neurobiological basis. Activities in this phase include daily or weekly reflection through an emotion journal and self-introspection (muhasabah) related to actions, as well as simple neuroscience education about brain functions relevant to emotions and behavior, presented in an interesting way through stories or analogies (Suyadi, 2022), followed by group discussions to share experiences.
- **Self-Regulation Phase (Mujadah & Neuroscience Exercises):** Aims to train learners to manage negative emotions, control impulses, and reinforce positive behaviors. Activities include self-control exercises (mujadah) such as assignments to delay satisfaction, honesty, and holding back anger (Jonedu, 2022), structured spiritual practices (riyadhah) such as solemn prayer guidance and directed dhikr (Huda et al., 2023), as well as Islamic relaxation and mindfulness techniques such as breathing exercises and muraqabah as a form of mindfulness that calms the nervous system (Huda et al., 2023).
- **Social Character Building Phase (Empathy & Social Neuroscience):** Aims to develop empathy, social concern, and prosocial behavior in accordance with Islamic values. Its activities include social projects or community services, moral case studies to analyze ethical dilemmas (Schaefer et al., 2019), habituation of *uswatun hasanah* through teacher modeling and discussion of exemplary stories to activate mirror neurons (Decety & Jackson, 2004), as well as role-playing.
- **Phase of Strengthening and Integration (Tafakur & Long-Term Plasticity):** Aims to internalize positive values and habits as part of a permanent self-identity. Its activities involve philosophical and philosophical discussions to reflect on the meaning of life (Yuniarti et al., 2021), a positive environment and reinforcement through constructive feedback and recognition of progress (Berridge & Kringelbach, 2015), as well as mentoring and example from teachers or mentors.

This model integrates Islamic spiritual practices and pedagogy with an understanding of neuroscience, creating a more comprehensive and effective approach in fostering the affective and spiritual intelligence of learners. Learning design can use a scheme that combines the physical environment (lighting, spatial planning) and mental activity (mind beat, challenges) to optimize brain function (Akbar & Suyadi, 2021).

3. Challenges and Further Research Directions

While this potential for convergence is promising, there are some challenges that need to be addressed. First, further empirical research is needed to test the effectiveness of the proposed learning model. Interventional studies that measure neurobiological changes (e.g., via fMRI or EEG) in students who follow a Neuro-Tazkiyah-based learning program would be invaluable. Second, it is necessary to develop a concrete curriculum and teaching materials, adjusted to the age level of students, to implement this model practically. Third, teacher training is crucial so that they have an adequate understanding of basic neuroscience and can integrate it effectively with the principles of Tazkiyatun Nafs.

Further research directions may include longitudinal studies on the long-term impact of the MPANT model on the character development and mental well-being of learners, comparative research between traditional affective learning methods in Islamic education and neuroscience-based models-Tazkiyatun Nafs, development of affective assessment instruments that are sensitive to neurobiological changes and spiritual development, as well as studies on the role of teachers as "facilitators" neuro-spiritual" in the context of Islamic education.

CONCLUSIONS

This systematic literature review confirms the significant convergence between the findings of modern neuroscience and the concept of Tazkiyatun Nafs in Islamic education. Neuroscience principles such as neuroplasticity, prefrontal cortex function, limbic system, and brain reward system, provide a strong scientific foundation for understanding the mechanisms behind the process of soul purification and the formation of Islamic character. Rather, the rich philosophy and practice of Tazkiyatun Nafs provides a relevant ethical and spiritual framework to direct the application of neuroscience in the context of education.

This convergence has profound implications for the development of holistic, effective, and relevant affective learning models. The proposed Neuro-Tazkiyah Affective Learning Model (MPANT) offers a conceptual framework that integrates self-awareness, self-regulation, social character building, and spiritual reinforcement, all supported by an understanding of how the brain works. Thus, Islamic education can move forward, forming a generation that is not only intellectually intelligent, but also emotionally and spiritually mature, and has solid noble morals. This integration is an important step towards a more comprehensive and responsive redefinition of Islamic education to the demands of modern times.

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