ISLAMIC STUDIES AND EDUCATION Journal
ISSN
https://jurnal.suriaacademicpress.com/index.php/ISEJ/index
Publisher By SURIA ACADEMIC PRESS
Volume 1, Number 1, December 2025

Neuroscience and Islamic Values in Learning Strategy Development

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OPEN ACSESS

ARTICLE HISTORY
Received: 2025-12-31
Revised: 2026-01-02
Accepted: 2026-01-06

KEYWORDS
Educational Neuroscience, Brain, Reason, Islam, Learning Strategies, Human Beings

ABSTRACT

Advances in neuroscience have opened new horizons in education, particularly in understanding how the brain works in the learning process. This article examines the integration of neuroscientific findings with Islamic educational values in designing effective, adaptive, and holistic learning strategies. Using a qualitative literature review approach, this article explores the concepts of brain function, the principles of neuroplasticity, and the role of emotions in learning, then links them to Islamic views on reason, spirit, and the formation of a perfect human being. The study results indicate that the learning process is strongly influenced by brain structure and function, including the involvement of emotions and meaningful experiences. Islamic education, through the concepts of reason and heart, aligns with a neuroscientific approach in developing a learning system based on compassion, personalization, and spirituality. Therefore, Islamic teachers and educational institutions need to understand the fundamentals of neuroscience to create adaptive and spiritually meaningful learning.

INTRODUCTION

The development of science and technology in the twenty-first century has brought significant changes to various aspects of human life, including the field of education. One branch of science that has recently gained major attention in the development of educational theory and practice is neuroscience, a discipline that studies the nervous system particularly the brain as the central controller of human activities, including learning processes. Educational neuroscience has emerged as an interdisciplinary field that integrates findings from neuroscience, cognitive psychology, and pedagogy to better understand how humans learn more effectively (Tokuhama-Espinosa, 2011).

The brain, as a biological organ, is not merely a physical structure but a highly complex and dynamic command center that regulates all mental, emotional, and motor activities. In the educational context, the brain is a crucial subject of study because all learning processes from initial perception and information processing to memory storage and decision-making involve brain function. Neuroscience has revealed how brain plasticity

(neuroplasticity) enables the brain to change and adapt based on learning experiences (Sousa, 2011). This indicates that learning is not a static process but a dynamic one that is strongly influenced by the environment, emotions, and cognitive stimulation.

Understanding how the brain works has direct implications for how educators design learning experiences. For instance, principles such as the importance of emotional engagement, meaningful repetition, adequate rest, and the use of multiple senses in learning are all rooted in neuroscientific findings (Jensen, 2008). Unfortunately, in educational practice, many traditional approaches still ignore the biological and neurological dimensions of learners. This often leads to ineffective teaching and learning processes and may even result in boredom and learning-related stress, which can negatively affect brain development.

From an Islamic perspective, understanding the brain and learning is not an unfamiliar concept. The Qur'an explicitly encourages humans to use reason and engage in thinking. Expressions such as *afala ta'qilūn* (do you not use your intellect?), *yatafakkarūn* (those who reflect), and *ya'qilūn* (people of understanding) emphasize the importance of intellectual activity in Islam. Intellect (*'aql*) is regarded as a great gift from Allah that distinguishes humans from other creatures. In Surah Al-Baqarah (2:269), it is stated: "He grants wisdom to whom He wills, and whoever is granted wisdom has certainly been given much good." This verse indicates that the capacity for thinking and learning holds spiritual value within Islamic teachings.

Prominent Islamic scholars such as Al-Ghazali, Ibn Sina (Avicenna), and Al-Farabi extensively discussed the nature of intellect and learning processes in their works. Ibn Sina, in *Kitab al-Najat*, explained stages of human cognition that closely align with concepts found in modern neuroscience. Al-Ghazali, in *Ihya' 'Ulum al-Din*, emphasized the purification of the heart and intellect as essential conditions for effective learning. Thus, although the term "neuroscience" was not known at that time, Islamic educational thought had already demonstrated a strong sensitivity to the mental, spiritual, and biological dimensions of human beings in an integrated manner.

Awareness of the importance of neuroscience in Islamic education has become increasingly relevant amid global challenges that demand holistic educational models. Education is no longer sufficient if it focuses solely on cognition and academic outcomes; rather, it must include a deep understanding of how students learn and develop. This is where neuroscience occupies a strategic position, as it provides a scientific foundation for designing learning strategies that address the brain, emotions, and spirituality of learners. The integration of neuroscience and Islamic values can strengthen the mission of Islamic education in forming *insan kamil* the ideal or complete human being who is intellectually competent and spiritually mature.

Moreover, Islam not only encourages learning but also regards it as an act of worship. A well-known hadith states, "Seeking knowledge is an obligation upon every Muslim" (reported by Ibn Majah). This concept introduces a moral and transcendental dimension to the learning process, distinguishing it from secular approaches. When learning is carried out with an understanding of the brain as a perfect creation of Allah, the learning process becomes an expression of gratitude and an effort to optimize the divine potential inherent within human beings. This perspective aligns with the spirit of *tawhid*, which lies at the core of the Islamic educational system.

Neuroscience also provides new insights into the uniqueness of each human brain. No two brains are identical, even among identical twins. This implies that, in educational practice, uniform teaching methods cannot be applied equally to all students. A "one-size-fits-all" approach to education is not only ineffective but also contradicts both

neuroscientific principles and the Islamic concept of justice. Therefore, personalized learning becomes a necessity to achieve optimal learning effectiveness (Tokuhama-Espinosa, 2011).

Islamic education, which is grounded in principles of compassion, respect for individual potential, and spiritual enlightenment, is highly compatible with a neuroscience-based approach that acknowledges the uniqueness of the human brain. In this context, teachers are not merely transmitters of knowledge but facilitators of brain development and character formation. They are expected to understand how the brain learns, how emotions influence learning processes, and how socio-emotional environments can either accelerate or hinder students' cognitive growth. In other words, Islamic education that is aligned with human *fitrah* is greatly supported by a scientific and humanistic neuroscience approach.

In this regard, collaboration between neuroscience and Islamic education becomes inevitable. It is no longer sufficient for educators to master religious knowledge or classical pedagogy alone; they must also understand the basic principles of neuroscience as a foundation for guiding learners in a holistic manner. This integration process is not merely about juxtaposing two disciplines but about building synergy to create learning experiences that align with the biological, psychological, and spiritual nature of human beings. Through this integration, Islamic education can respond to contemporary challenges while preserving divine values within the teaching and learning process.

The global trend toward evidence-based education further emphasizes the importance of neuroscience in developing effective educational policies. Governments and Islamic educational institutions are expected to begin considering findings from neuroscience research as a basis for curriculum design, teaching methods, and learning assessment. By combining the strengths of modern scientific knowledge and Islamic teachings, education becomes not only a means of knowledge transmission but also a process of human transformation toward intellectual maturity and heightened spiritual awareness.

Given the significant relationship between the brain, learning processes, and education within the Islamic context, this paper seeks to further examine the contribution of neuroscience to education, particularly Islamic education, by highlighting how an understanding of brain function can enrich learning practices and strengthen holistic and transcendental Islamic pedagogical approaches. In this way, Islamic education is expected to produce graduates who are not only academically competent but also spiritually strong and emotionally resilient.

METHOD

This article employs a qualitative approach using a library research method. Data were collected through a critical review of relevant scholarly literature, including neuroscience books, journals on Islamic education, classical works by Muslim scholars such as Al-Ghazali and Ibn Sina, as well as contemporary empirical references from experts such as Jensen, Doidge, and Tokuhama-Espinosa. The analysis was conducted using a descriptive-analytical approach by linking neuroscientific concepts of brain function and learning with values in Islamic education in order to formulate an integrative and holistic learning approach.

RESULTS AND DISCUSSION

Brain Functions in the Learning Process

Learning is a complex activity that cannot be separated from the functioning of the brain as the central controller of the nervous system. Every learning experience, whether conscious or unconscious, involves various parts of the brain working synergistically. Understanding how the brain functions in the learning process is therefore a key foundation

for designing effective learning strategies that are aligned with the biological characteristics of learners.

Anatomically, the brain consists of several major parts, namely the cerebrum, cerebellum, and brain stem. The cerebrum is the largest part and is divided into two hemispheres the left and right hemispheres each of which performs different functions. The left hemisphere is generally associated with logic, language, and analytical processing, while the right hemisphere is related to creativity, intuition, and visual-spatial perception (Sousa, 2011). In educational contexts, an understanding of brain lateralization is essential for developing balanced learning approaches that integrate logical reasoning and aesthetic expression.

Each region of the cerebrum plays a specific role in supporting the learning process. The frontal lobe, for example, is responsible for decision-making, problem-solving, planning, and emotional regulation. The temporal lobe is involved in auditory and language processing as well as long-term memory storage. The parietal lobe manages sensory information such as touch and spatial orientation, while the occipital lobe is responsible for visual processing (Jensen, 2008). By understanding these functions, teachers can design learning activities that activate multiple brain areas and strengthen cognitive integration.

One of the most important concepts in neuroscience related to learning is neuroplasticity, which refers to the brain's ability to change and adapt based on new experiences. The brain is not a rigid structure; rather, it is highly flexible and responsive to stimulation. When a person learns something new, changes occur in the synaptic networks between neurons, strengthening frequently used connections and weakening those that are rarely activated (Doidge, 2007). Thus, learning can be understood as a process of reshaping the brain through repetition, experience, and reflection.

Meaningful learning strengthens specific neural pathways that form the foundation of long-term memory. However, for information to be stored in long-term memory, it must pass through several stages of processing. Initially, information is received by the senses and enters sensory memory. If deemed relevant, it is transferred to short-term or working memory, which has limited capacity. Through practice, elaboration, and repetition, information can eventually be stored in long-term memory (Sousa, 2011). This process demonstrates that memory consolidation requires active and contextual learning strategies rather than one-way lecturing.

Emotions also play a crucial role in the learning process. The limbic system of the brain, particularly the amygdala and hippocampus, plays a central role in regulating emotions and memory. When learners feel happy, motivated, or interested in the material, the limbic system enhances attention and strengthens information storage. Conversely, negative emotions such as stress, anxiety, and fear can inhibit learning because the amygdala triggers a "fight or flight" response that suppresses higher cognitive functions in the prefrontal cortex (Jensen, 2008). Therefore, emotionally supportive learning environments are essential for optimizing brain function.

From the perspective of Islamic education, the intellect (*'aql*) is regarded as the center of human consciousness that also governs behavior, similar to the role of the brain in neuroscience. The Qur'an frequently uses terms related to intellect and mental activity, such as *ya'qilūn*, *yatafakkarūn*, and *yadhdhakkarūn*, which emphasize commands to think, reflect, and remember. Classical scholars such as Al-Ghazali viewed intellect as a primary instrument for attaining truth alongside revelation. In *Ihya' 'Ulum al-Din*, Al-Ghazali emphasized that intellect is not merely a logical capacity but also a moral and spiritual faculty cultivated through knowledge and proper conduct (*adab*).

When examined alongside neuroscience, the Islamic concept of *'aql* shows similarities to the function of the human prefrontal cortex, which is responsible for ethical decision-making, impulse control, and long-term planning. Consequently, learning should not be directed solely toward intellectual intelligence (IQ) but also toward emotional intelligence (EQ) and spiritual intelligence (SQ), all of which involve different brain regions. The Islamic concept of *insan kamil* reflects a balanced development of these potentials, which should be nurtured holistically through education.

The implications of neuroscientific understanding of brain function are extensive in educational practice. For instance, repetition and variation in instructional delivery are essential for strengthening synaptic connections. Teachers who understand that the brain learns through association are more likely to employ experiential learning strategies, simulations, and visual-auditory media. The neuroscience principle of "use it or lose it" indicates that neural connections that are not actively used will weaken, highlighting the need for learning activities that engage students' cognitive abilities actively (Tokuhama-Espinosa, 2011).

Furthermore, brain function research shows that each student has a unique learning style. Some learners are more visual, others auditory or kinesthetic, reflecting differences in dominant brain activation patterns. Therefore, multisensory learning approaches are essential to accommodate diverse neural needs. In this context, teachers function not merely as content deliverers but as architects of learning environments that stimulate and develop the full potential of students' brains.

It is also important to recognize that the brain develops in stages according to age and experience. Children's brains are not fully mature, particularly the prefrontal cortex, which is responsible for planning and decision-making. This implies that instructional strategies for children cannot be equated with those for adults. In Islamic tradition, the Prophet Muhammad (peace be upon him) exemplified gradual and age-appropriate education. Classical Islamic education also recognizes the concept of *marḥalah* (learning stages), which aligns with neuroscientific principles of brain development.

The importance of sleep, nutrition, and physical activity for brain function in learning must also be acknowledged. The brain requires adequate sleep to consolidate memories and reorganize information acquired throughout the day. Proper nutrition, such as adequate intake of omega-3 fatty acids and B vitamins, supports neural cell health. Physical exercise stimulates the production of brain-derived neurotrophic factor (BDNF), a protein that supports neuron growth and survival. In Islamic teachings, a healthy lifestyle is strongly encouraged, including maintaining proper sleep patterns, consuming halal and *ṭayyib* food, and engaging in physical activity all of which contribute positively to brain health.

Overall, understanding brain function in the learning process encourages us to view education not merely as the transmission of knowledge but as a complex biological and spiritual process. Teachers, as facilitators of learning, must recognize that every educational activity has a direct impact on the structure and function of students' brains. Therefore, all educational decisions from curriculum design and instructional methods to assessment should be grounded in a scientific understanding of how the brain works while also incorporating Islamic values that emphasize intellect, *adab*, and worship in the pursuit of knowledge.

Neuroscience and Learning Strategies

1. Integration of Neuroscience in Education

Advances in neuroscience have provided new insights into how the human brain processes information, forms memories, and responds to environmental stimuli. These

findings have had a significant impact on education, particularly in the design of learning strategies that are more effective and aligned with how the brain functions. Educational neuroscience is an interdisciplinary field that connects neuroscience, psychology, and pedagogy to explain how students learn and how teaching can be adapted to the brain's fundamental biological principles (Tokuhama-Espinosa, 2011).

The application of neuroscience in education not only enriches teaching methods but also encourages educators to better understand learners' neuropsychological conditions. Effective learning strategies are not solely content-based but also take into account neurodiversity, emotional states, stress levels, and students' brain readiness for learning. This is crucial because the brain is highly plastic and adaptive. Through appropriate learning experiences, synaptic connections in the brain can be strengthened, modified, and even reorganized (Doidge, 2007).

2. Neuroscience Principles in Learning Strategies

Several core principles of neuroscience are particularly relevant to learning strategies, including:

a. Neuroplasticity
   The brain has the ability to change based on experience and practice. This means that repetitive, meaningful, and contextual learning can shape new brain structures that support learners' competencies.
b. Emotions Influence Learning
   The limbic system, which regulates emotions, is closely connected to the prefrontal cortex (logic) and the hippocampus (memory). When negative emotions such as anxiety or fear dominate, learning capacity decreases significantly (Jensen, 2008).
c. Multimodal Learning
   The brain processes information more efficiently when content is delivered through multiple modalities visual, auditory, kinesthetic, and affective. Multisensory learning increases the activation of broader brain areas, thereby strengthening understanding.
d. Context and Meaningfulness
   Information that carries personal meaning or is connected to real-life experiences is more easily processed and retained by the brain.

Based on these principles, educators are required to design **brain-friendly learning**, namely instructional strategies that align with how the brain absorbs and stores information.

3. Learning Strategies Based on Neuroscience Principles

a. Contextual and Meaningful Learning
   One key strategy supported by neuroscience is contextual learning. The brain more easily understands and retains information that is directly relevant to students' daily lives. Meaningful contexts create simultaneous activation of long-term memory, affective processing (emotions), and language networks.
   This approach aligns with the Islamic educational principle of *tafaqquh fi al-din*, which emphasizes deep understanding of knowledge that is beneficial in life. In this context, learning materials are not only cognitively understood but also internalized, practiced, and disseminated, thereby integrating intellectual functions with spiritual dimensions.
b. Positive Emotional Learning
   Emotionally safe, supportive, and respectful learning environments play a crucial role in learning effectiveness. The amygdala within the limbic system is highly sensitive to threats and stress. When students feel afraid or pressured, information processing is inhibited. Conversely, feelings of safety and enjoyment facilitate the activation of the

hippocampus and prefrontal cortex, allowing learning to occur optimally (Sousa, 2011).

Learning strategies that emphasize positive approaches such as collaborative learning, discussion-based methods, and affective reflection can foster a healthy learning climate. In Islam, the principle of *rahmatan lil 'alamin* emphasizes compassion as the primary approach to education rather than coercion or pressure.

c. Repetition and Elaboration Strategies

The brain learns through repetition. New synaptic connections are formed when information is reinforced through practice and elaboration. Meaningless repetition is easily forgotten, whereas repetition enriched with discussion, questioning, and practical application facilitates storage in long-term memory.

Teachers can apply strategies such as SQ3R (Survey, Question, Read, Recite, Review), concept mapping, and peer teaching. These strategies are closely aligned with the Islamic concept of *tadabbur*, which involves deep reflection on the meaning and wisdom of knowledge.

d. Active and Participatory Learning

Neuroscience research shows that passive learning (listening only) activates only limited brain areas. In contrast, active learning such as project-based tasks, presentations, role-playing, and real-world problem solving activates multiple neural networks simultaneously, thereby strengthening understanding and memory (Tokuhama-Espinosa, 2011).

In Islamic education, this strategy parallels the concept of *'amal* (practice), emphasizing that knowledge is not merely to be known but to be applied. The educational practices of the Prophet Muhammad (peace be upon him) exemplify learning through direct practice, participation, and multisensory engagement.

e. Multisensory and Differentiated Learning

Each student has different learning styles and neural strengths. Some learners are more visual, auditory, verbal, or kinesthetic. Effective learning must accommodate these differences by offering multiple modes of content delivery.

Neuroscience demonstrates that the more brain areas are activated, the greater the likelihood that information will be strongly retained. Therefore, the use of visual media (images, videos), manipulatives, motor activities, and simulations is highly recommended to strengthen learning pathways (Jensen, 2008).

4. Relevance of Neuroscience-Based Strategies in Islamic Education

Islamic education views learning as an integral part of worship. The Qur'an contains numerous verses that encourage thinking (*tafakkur*), reflection (*tadabbur*), and drawing lessons (*'ibrah*). These cognitive activities require optimal brain function supported by emotionally and spiritually healthy learning environments.

Neuroscience-based learning strategies can serve as a means to realize holistic (*kaffah*) Islamic education, which not only transmits knowledge but also shapes character, morality, and divine awareness. The Islamic concept of *qalb*, encompassing intellect, emotion, and spirituality, aligns with the neuroscientific view of the integration of cognitive and affective brain functions.

Furthermore, Islamic education that adopts a neuropedagogical approach can respond to twenty-first-century challenges by nurturing individuals who are not only intellectually capable but also resilient, empathetic, and wise. Brains trained both scientifically and spiritually will produce balanced individuals (*insan kamil*), which is the ultimate goal of Islamic education.

5. Practical Implications for Teachers and Educational Institutions

Based on the discussion above, several important implications for teachers and educational institutions can be identified:

a. Teachers should understand basic brain functions to select instructional methods appropriate to students' conditions.
b. Learning designs should align with neuroplasticity principles and the critical role of emotions in learning.
c. Learning environments must foster safety, collaboration, and enjoyment.
d. The use of interactive and multisensory learning media should be expanded to accommodate diverse learning styles.
e. Learning assessment should focus not only on outcomes but also on learning processes and students' mental and emotional engagement.

The integration of neuroscience and learning strategies offers substantial potential for improving the quality of Islamic education. By understanding how the brain works, educators can design learning experiences that are more adaptive, effective, and humane. Strategies aligned with neurobiological principles not only enhance cognitive intelligence but also address affective and spiritual dimensions, which are the distinctive characteristics of Islamic education. Thus, neuroscience is not merely a technical study of the brain but can serve as a form of modern wisdom that supports Islam's mission to cultivate knowledgeable, faithful, and ethically grounded human beings.

Islamic Perspectives on Intellect (*'Aql*) and the Learning Process

1. Intellect in the Perspective of the Qur'an and Hadith

In Islamic thought, intellect (*'aql*) holds a highly noble status. It is not merely a tool for thinking, but the primary means for acquiring knowledge, understanding truth, and distinguishing between what is right (*ḥaqq*) and wrong (*bāṭil*). The Qur'an employs various terms related to intellect, including *'aql*, *tafakkur* (reflection), *tadhakkur* (taking lessons), and *tafaqquh* (deep understanding). Although the term *'aql* does not appear in the Qur'an as a noun, it occurs 49 times in verbal forms, indicating that intellect is an active process rather than a static entity (Mulyadhi, 2020).

One example is found in the following verse:

"Indeed, in that are signs for a people who reflect." (Qur'an, Ar-Rum [30]: 21)

This verse emphasizes that understanding natural, social, and existential phenomena is attainable only through the active use of intellect. In the educational context, the use of intellect serves as the fundamental basis for developing rational, critical, and truth-oriented character.

The Prophet Muhammad (peace be upon him) also highlighted the importance of intellect in learning and religious understanding. He stated:

"A person's religion is not complete until his intellect is complete." (Reported by Ahmad)

This hadith indicates that intellect and religion are complementary. Religion without intellect may lead to blind fanaticism, while intellect without religion may result in moral relativism. Thus, in Islam, the learning process represents a harmonious interaction between rational capacity and divine guidance.

2. Intellect as a Means of Knowing God

One of the most profound functions of intellect in Islam is to serve as a means of knowing Allah. Intellect is not used solely to understand empirical phenomena, but also to

explore the existential meaning behind human existence and the universe. Therefore, learning in Islam is not secular in nature, but deeply spiritual, aiming to bring human beings closer to their Creator.

The Qur'an states:

"Indeed, in the creation of the heavens and the earth and the alternation of night and day are signs for people of understanding." (Qur'an, Ali 'Imran [3]: 190)

This verse demonstrates that the pursuit of knowledge is a contemplative process that leads to *tawhidic* awareness. Learning, therefore, is not merely a cognitive activity but also a spiritual journey. All knowledge ultimately culminates in the recognition of Allah's greatness and human limitations.

Classical Muslim scholars also emphasized that intellect serves as a "bridge" to faith. Imam Al-Ghazali asserted that the primary function of intellect is to recognize truth, and that all authentic knowledge ultimately deepens faith. Consequently, Islamic education is education that cultivates intellect as a pathway to divine guidance (*hidayah*).

3. Al-Ghazali's Views on Intellect, Brain, and Learning

Al-Ghazali (1058–1111 CE), one of the most influential Muslim thinkers in philosophy, spirituality, and education, articulated profound insights into intellect and learning. In *Ihya' 'Ulum al-Din*, he distinguished between innate intellect (*al-'aql al-jibilli*) and acquired intellect (*al-'aql al-muktasab*), which develops through experience and learning. This perspective closely aligns with the modern neuroscientific concept of neuroplasticity, which holds that the brain and intellect can develop through training and experience.

Al-Ghazali explained that human intellect is guided by two primary sources: the senses and revelation. The senses capture empirical phenomena, while revelation provides direction and purpose. He strongly criticized educational models that focus exclusively on technical or rational aspects, arguing that such approaches may distance individuals from the deeper meaning of life. For Al-Ghazali, true learning is learning that revives the heart, not merely one that fills the brain with data.

Furthermore, Al-Ghazali emphasized the importance of intention (*niyyah*), sincerity (*ikhlas*), and moral conduct (*akhlaq*) in the learning process. He argued that those who seek knowledge solely for worldly gain suffer spiritual loss, whereas those who learn for the sake of Allah attain blessed and beneficial knowledge (*'ilm nāfi'*). In this framework, intellect is not merely a cognitive faculty but a divine trust (*amanah*) that must be exercised ethically and spiritually.

4. Ibn Sina's Views on the Brain, Intellect, and Education

In contrast to Al-Ghazali's spiritually oriented approach, Ibn Sina (Avicenna, 980–1037 CE) offered a more philosophical and scientific perspective. In his works *Al-Shifa'* and *Al-Najat*, Ibn Sina systematically elaborated theories of the soul and intellect. He classified intellect into several stages: potential intellect (*al-'aql bi al-quwwah*), actual intellect (*al-'aql bi al-fi'l*), and acquired intellect (*al-'aql al-mustafād*). Learning, in this view, represents the progression from potential intellect to actual intellect through practice, observation, and contemplation.

Ibn Sina was also among the early scholars to distinguish between the functions of the brain and the soul. He maintained that the brain governs sensory and motor activities, while intellect resides within a higher spiritual dimension. Nevertheless, the two are deeply interconnected. Therefore, education must address all dimensions of the human personality: physical, rational, and spiritual (Nasr, 2006).

In pedagogy, Ibn Sina emphasized the importance of developmental stages in learning. He recommended that education be aligned with learners' age and intellectual maturity. For children, learning should begin with educational play (*ta'lim la'ibi*), gradually advancing toward logic and philosophy during adolescence. This view strongly resonates with modern neuroscientific principles of cognitive development and age-related learning capacity (Sousa, 2011).

5. Theological Reflection and Contemporary Education

Islamic perspectives on intellect and learning provide a robust theological framework for the development of educational neuroscience. While neuroscience explains how the brain works, Islam offers guidance on the purpose for which the brain is used. In Islam, intellect is not merely a tool for thinking but a means to attain ultimate truth, comprehend revelation, and cultivate piety.

In contemporary education, the integration of neuroscience and Islamic education enables the development of holistic learning models that not only enhance intellectual abilities but also honor thinking as an act of worship. In Islam, thinking is not merely an academic exercise but a form of spiritual reflection on God's creation.

From an Islamic perspective, intellect and brain are not separate entities but complementary dimensions of human nature as rational and faithful beings. The Qur'an and Hadith encourage the use of intellect as a path to knowing Allah and understanding life. Scholars such as Al-Ghazali and Ibn Sina have provided rich intellectual foundations that bridge reason and revelation. Therefore, Islamic education informed by neuroscience holds the potential to cultivate individuals who are intellectually capable, spiritually profound, and morally grounded.

Implications of Neuroscience in Islamic Education

The rapid development of neuroscience over the past few decades has had a significant impact on the field of education. Neuroscience, as a discipline that examines the structure and function of the brain and its influence on behavior and learning processes, offers new insights for educators in understanding how students learn. In the context of Islamic Education, neuroscience is not merely a scientific framework but can be meaningfully integrated with Islamic spiritual and ethical values to develop a holistic, humanistic, and transformative educational system.

1. The Importance of Teachers' Understanding of Students' Brain Functions

In the learning process, teachers act as primary facilitators who determine instructional strategies, methods, and approaches. Therefore, it is essential for teachers to understand how the brain functions in learning, including information processing, memory formation, emotional regulation, and concentration. Knowledge of basic neuroscience principles enables teachers to design learning experiences that are more effective, personalized, and contextually appropriate.

Research indicates that the brain does not learn in a linear or uniform manner but exhibits diverse learning styles and varying speeds of information processing (Sousa, 2011). For instance, the left hemisphere is generally associated with logical and analytical activities, while the right hemisphere is linked to creativity and emotional processing. Awareness of these differences allows teachers to balance instructional activities between logic and imagination.

Understanding neurodevelopmental stages is also crucial. Children's brains, especially in early childhood, are in an intensive growth phase characterized by rapid synaptic connectivity and ongoing myelination. At this stage, children respond more effectively to

repetitive, visual, and concrete learning experiences. Teachers who recognize these characteristics are less likely to employ overly abstract methods and instead design instruction aligned with students' cognitive capacities (Jensen, 2008).

From an Islamic perspective, education is regarded as a divine trust (*amanah*), and teachers carry a moral responsibility to deliver knowledge with compassion and consideration for students' intellectual capacities. This principle is reflected in the Prophet Muhammad's saying: *"Speak to people according to the level of their understanding"* (HR. Muslim). This hadith implicitly emphasizes the importance of understanding learners' cognitive conditions, making neuroscience-based awareness a practical manifestation of prophetic educational values.

2. Development of Neuroscience-Based Learning Methods Integrated with Islamic Values

Educational neuroscience has introduced various instructional strategies that enhance learning effectiveness, including multisensory learning, experiential learning, and emotionally positive learning environments. These approaches are highly compatible with Islamic educational principles.

One strategy aligned with neuroscience is contextual teaching and learning, which enables the brain to connect new information with prior knowledge and real-life experiences, thereby strengthening long-term memory (Sprenger, 2005). In Islam, this approach resonates with the concept of *tadabbur*, which encourages learners to reflect on knowledge in relation to everyday life.

Neuroscience also highlights the role of emotional and spiritual conditions in learning. Positive emotional states facilitate learning by preventing excessive amygdala activation, whereas negative emotions such as fear and anxiety inhibit hippocampal function and memory formation (LeDoux, 2002). Islamic educational tradition has long emphasized a compassionate, supportive, and pressure-free learning environment, as advocated by scholars such as Imam Al-Zarnuji in *Ta'lim al-Muta'allim*.

These principles can be implemented through:

a. Value-based cooperative learning**,** fostering collaboration, empathy, and moral character;
b. Reflective learning **(***muhasabah learning***)**, encouraging self-reflection and awareness of life purposes;
c. Integrative thematic learning, connecting general subjects with Islamic values to engage cognitive, affective, and spiritual dimensions simultaneously.

Such an approach promotes the development of learners who are intellectually capable and spiritually grounded, addressing the brain, heart, and behavior as an integrated whole.

3. Integration of Knowledge and Faith as a Holistic Approach

Islamic education aims not only to produce intellectually competent individuals but also faithful, pious, and morally upright persons. Learning that focuses solely on cognitive outcomes risks losing its spiritual essence if it neglects affective and spiritual dimensions. This underscores the importance of a holistic approach integrating knowledge and faith.

This integration is further reinforced by findings in neuroscience, particularly spiritual neuroscience, which suggests that religious practices such as prayer, *dhikr*, and supplication stimulate positive emotional centers in the brain, enhancing focus and inner calm (Newberg & Waldman, 2009). Consequently, Islamic education informed by neuroscience can harmonize intellectual reasoning with spiritual consciousness.

For example, integrating scientific subjects with Qur'anic verses related to the creation of the universe can evoke a sense of awe (*ta'ajjub*) that strengthens monotheistic

awareness. Such learning experiences are more memorable and contribute to the formation of a deeply rooted Islamic character.

This holistic vision aligns with Al-Attas's (1980) conception of Islamic education as *"the process of recognizing and acknowledging the proper place of everything in the order of creation, leading to justice in action."* This objective necessitates balance between rational and spiritual dimensions, between intellectual intelligence and spiritual wisdom.

In conclusion, the implications of neuroscience for Islamic education offer significant opportunities to enhance learning quality. Teachers' understanding of students' brain functions leads to instructional methods aligned with how the brain naturally learns. Integrating neuroscience principles with Islamic values results in comprehensive learning that nurtures both intellect and spirituality. Ultimately, neuroscience serves not merely as a technical tool but as part of an Islamic epistemological ethos that honors reason, heart, and revelation as a unified foundation of the learning process.

CONCLUSION

This study emphasizes that a sound understanding of brain function is essential for designing effective and humane learning strategies. Neuroscience provides a solid scientific foundation for explaining how learning occurs, highlighting the roles of neuroplasticity, emotion, and meaningful context in the learning process. From an Islamic perspective, learning is not merely a cognitive activity but a spiritual endeavor that involves the integration of intellect (*'aql*), heart (*qalb*), and divine guidance (*wahy*). Islamic education that integrates neuroscience principles has the potential to foster holistic human development (*insan kamil*), producing learners who are intellectually capable, emotionally mature, and spiritually grounded. Consequently, the implementation of learning strategies aligned with both neuroscience and Islamic values necessitates the continuous professional development of educators, the design of integrative curricula within Islamic educational institutions, and further empirical research to examine neuroscience-based instructional models in contemporary Islamic education contexts. Such an integrative approach is expected to create more personalized, adaptive, and sustainable educational practices that contribute meaningfully to long-term character formation.

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