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Proposed model for developing educational neuroscience management in Arab schools from the perspective of school leadership

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Abstract

This study aimed to develop a proposed model for managing educational neuroscience in Arab schools from the perspective of school leadership. A mixed-method research design was employed, combining a quantitative approach through a questionnaire administered to 420 educational leaders and a qualitative approach via semi-structured interviews with 40 leaders and experts. The study tools focused on assessing leaders' awareness and practices regarding educational neuroscience management principles, identifying obstacles, and proposing an integrated developmental framework. Results indicated that leaders' awareness of educational neuroscience management principles was moderate (M = 3.51), with variations across dimensions; leadership neuroscience thinking ranked highest, whereas brain-based decision-making showed the lowest awareness and implementation. Practical application of educational neuroscience management practices was also moderate (M = 3.55), with relative strength in motivation and neurolearning, and the lowest application in brain-based decision-making. The study identified several high-impact obstacles hindering neuroscience management implementation, notably the lack of specialized training and weak supportive organizational culture, with an overall obstacle mean of 4.31 (73%), emphasizing the urgent need for sustainable organizational and training strategies. Based on quantitative and qualitative analyses, a proposed model was developed comprising four main dimensions: leadership neuroscience thinking, neuro-emotional intelligence, brain-based decision-making, and neuro learning and motivation management. The model includes practical mechanisms to enhance applied training, improve institutional support, and foster a school culture grounded in neuroscience knowledge. The study concluded that integrating neuroscience into Arab school management is a strategic necessity to enhance leadership effectiveness, improve the learning environment, and increase teacher and student motivation. Practical implementation requires continuous training programs, institutional support, and a flexible organizational culture that encourages neuro-innovation and sustainable educational change.

Keywords: Educational neuroscience management, School leadership, Neuro-Emotional intelligence, Brain-Based Decision-Making, Neurolearning and motivation, Arab education, School development, Modern educational management

Introduction

Modern educational systems are undergoing significant transformations due to rapid advancements in neuroscience and technological fields, necessitating a reconsideration of teaching and school management methods. Recent research in neuroscience has revealed numerous insights into human brain functioning and how emotions, motivation, memory, and social learning influence the academic and behavioral performance of both students and teachers (Tokuhama-Espinosa, 2018; Sousa, 2017). These developments have led to the emergence of a new interdisciplinary field known as Educational Neuroscience, which aims to integrate brain research findings into educational and administrative practices within educational institutions (Carew & Magsamen, 2010).

Understanding the close relationship between the brain, learning, and management has become a fundamental pillar for educational development.

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While traditional curricula focused on observable behaviors of learners and staff, the neuro-educational approach seeks to understand internal processes that explain such behaviors, such as information processing, emotion regulation, and responses to reward and punishment (Goswami, 2015). Consequently, a new trend in educational leadership has emerged, called Neuro-Educational Management, which is an administrative approach aimed at utilizing neuroscience principles to develop a human-centered learning environment that comprehends the neural mechanisms influencing thinking, behavior, and decision-making (Rock, 2020).

Schools currently face increasing challenges related to rapid technological changes, work pressures, and the psychological and social needs of students and teachers, making traditional administrative models insufficient for managing these variables (Guo et al., 2025). Recent research indicates that the effectiveness of school leadership depends on the leader's ability to employ neuro-emotional skills to understand how the brain interacts with stress and how the organizational environment affects individual productivity and motivation (Immordino-Yang & Damasio, 2021; Fatima et al., 2025). From this perspective, neuro-educational management emerges as a scientific approach that integrates neural knowledge into administrative and educational practices, enhancing institutional performance.

The field of educational administration has evolved significantly over the past decades, moving from bureaucratic management based on orders and control to human-centered management focused on social and emotional relationships, and more recently to neuroscience-based management, which examines the biological and behavioral foundations of those relationships (Rock, 2020). This epistemic shift represents a revolution in educational thought as it is based on scientific evidence from brain research and opens new horizons for understanding school leadership as a complex neuro-social process involving interactions between emotion and cognition (Tokuhama-Espinosa, 2019). Thus, schools are understood as neuro-social systems in which students, teachers, and administrators interact within a network of relationships governed by precise neuro-emotional dynamics.

The importance of educational neuroscience management lies in its ability to help leaders and teachers understand learning, motivation, and emotional mechanisms from a scientifically accurate perspective. As Sousa (2017) notes, understanding how the brain responds to reward, threat, and challenge enables leaders to adopt strategies that foster creativity and reduce conflict within the work environment. Neuro-educational management also contributes to enhancing psychological and social safety, which is one of the most important factors supporting engagement and professional commitment (Immordino-Yang & Damasio, 2021). Rock (2020) emphasizes that a successful neuro-leader is one who manages neural energy in the school environment in ways that maintain attention, regulate emotions, and create a supportive environment for intrinsic motivation and collective belonging.

Despite the growing global interest in educational neuroscience management, theoretical and practical frameworks for this concept remain limited in the Arab context. Studies (Al-Mashaqbeh, 2025; Daradkeh, 2025) indicate that Arab educational institutions lack training and research programs that integrate neuroscience knowledge into educational leadership. Moreover, the prevailing organizational culture in many Arab schools is still dominated by traditional bureaucratic patterns, limiting the adoption of neuroscience management concepts that require flexibility and openness to change. Therefore, building an Arab model for educational neuroscience management represents a strategic necessity for developing Arab education and improving the professional quality of life for teachers and school leaders.

Advanced countries today are increasingly applying neuroscience principles in curriculum design and educational administration, establishing Neuro-Schools and neuro-training centers aimed at preparing leaders with advanced neuro-emotional skills (Howard-Jones, 2014). Furthermore, artificial intelligence is being integrated with neuroscience to develop intelligent analytical tools capable of assessing attention, motivation, and stress in real-time (Guo et al., 2025). These global trends indicate that developing educational neuroscience management in Arab schools is no longer an academic luxury but an urgent necessity to enhance

educational efficiency and institutional sustainability.

The significance of this study lies in addressing the clear deficit in neural awareness among Arab educational leaders and in building a scientific framework that clarifies the relationship between neuroscience knowledge and educational management. It also responds to the demands of modern educational environments, which require leaders capable of combining scientific-humanistic thinking with the ability to manage emotions and stimulate minds. Therefore, the main objective of the study is to provide a comprehensive scientific vision for developing educational neuroscience management in Arab schools, contributing to building conscious leadership capable of navigating the cognitive and emotional complexity of the educational environment.

This study represents a scientific effort to integrate neuroscience into the Arab educational management context by proposing a comprehensive model for educational neuroscience management that aligns with local cultural and social specificities and is grounded in contemporary neural and behavioral principles. The study contributes to enriching educational literature and providing a modern perspective to build schools that are more aware of the human brain and more capable of achieving a stimulating, human-centered, and sustainable learning environment.

Over the past decade, there has been a marked increase in interest in educational neuroscience as a multidisciplinary field linking brain sciences, psychology, and educational sciences. Howard-Jones (2014) highlighted that educational neuroscience serves as a vital bridge between understanding neural processes and educational behavior, noting that applying brain principles in classroom practices enhances attention, motivation, and learner achievement. He emphasized the importance of developing teacher preparation programs based on neuroscience knowledge rather than relying solely on traditional practices.

Dubinsky, Roehrig, and Varma (2017) developed a model integrating neuroscience and teacher training to analyze the effectiveness of incorporating brain principles into professional development programs. Results indicated that teachers trained in neuroscience demonstrated greater ability to understand individual learning differences and adapt their strategies based on brain activity, thus enhancing educational effectiveness.

Tokuhama-Espinosa (2018) provided a robust theoretical framework for integrating educational neuroscience into educational policies through what she termed the "research-practice integrative model," demonstrating that schools adopting brain-based strategies achieve higher academic performance and broader knowledge engagement, emphasizing that collaboration between researchers and teachers is essential for successful neuro-education.

Howard-Jones et al. (2019) addressed the prevalence of "neuromyths" among teachers, such as categorizing students by auditory or visual learning styles. Their findings revealed that misinterpretation of neural processes leads to inaccurate educational practices, recommending the establishment of a critical culture grounded in scientific research to interpret educational phenomena.

In the Arab context, Al-Sayyed (2020) examined applications of educational neuroscience in improving active learning strategies in Arab schools. The study explored the impact of teacher training on brain principles in enhancing creative thinking and academic achievement. Findings indicated that neuroscience-based training improved students' critical thinking and innovation skills and recommended integrating educational neuroscience courses within Arab teacher preparation programs.

Al-Qudah (2021) explored the awareness of educational neuroscience among Jordanian school leaders, concluding that administrations understanding neural learning processes exhibit higher efficiency in supporting motivating and inclusive learning environments. Leaders with deeper neuroscience knowledge adopt more equitable and stimulating educational policies.

From a curriculum development perspective, Thomas and Ansari (2022) found that incorporating neuroscience principles into curriculum design fosters analytical and creative thinking among learners. They emphasized that curriculum design should consider brain developmental stages and information-processing patterns.

Khalidi (2023) addressed educational neuroscience management in Arab schools, focusing on building an administrative model based on neuroscience principles in interactions with teachers and students. The study concluded that adopting neuro-management improves communication quality**,** enhances emotional balance, and leads to more stable and efficient institutional performance.

Globally, studies in 2024 and 2025 deepened understanding of the relationship between neuroscience and digital and emotional learning practices**.** Jailani (2025) developed Arab brain-based educational media during the COVID-19 pandemic, proving their effectiveness in enhancing student achievement even in remote learning environments. Antonopoulou (2025) demonstrated that applying emotion-regulation techniques grounded in neuroscience, such as mindfulness and attention control, improves academic performance and reduces school anxiety.

Alkhassawneh and Al-Sharif (2025) examined the relationship between neuroscience and designing technology-supported learning strategies, emphasizing the importance of integrating neurolearning and digital learning in brain-responsive educational environments**.** Similarly, Almarzouki et al. (2025) found that students with higher awareness of neuroscience concepts achieve better academic performance, supporting the call for spreading neuroscience literacy in higher education.

Recent studies indicate a clear trend toward integrating neuroscience more practically into educational applications, particularly in contexts involving: Educational technology**:** Using brain-based educational media to enhance learning, which was less evident in earlier studies focused on theory or emotional skills alone, Emotion regulation and teacher professional development**:** Emotions are now recognized as active factors requiring training and regulation, particularly through interactive training programs, Neural awareness among students: Research is emerging on students' understanding of brain concepts and their impact on academic performance, Experiential learning during exceptional contexts, such as the COVID-19 pandemic, providing data on how neuroscience interventions help adaptation.

Despite progress, gaps remain in Arab studies regarding sample size, geographic diversity, and rigorous experimental applications, especially at school levels rather than universities.

In conclusion, the critical review of these studies shows that educational neuroscience has evolved from theoretical explanations of brain processes (2014–2018) **to** more practical and institutional applications (2020–2025)**.** Three main themes emerged in recent research: Integrating neuroscience with educational technology, focusing on emotion regulation and affective learning, Expanding the concept toward neuro-leadership and management in schools**.**

Despite noticeable progress, gaps persist in applied Arab studies, particularly in measuring the direct impact of neuroscience knowledge on educational administration performance.

Problem statement

Educational institutions in the Arab world today face accelerating challenges related to their ability to adapt to the knowledge and technological revolution, as well as neuro-educational transformations that have reshaped the concept of learning and teaching in the twenty-first century. Knowledge about brain mechanisms and their relationship to processes of thinking, attention, motivation, and emotion has become a key pillar for educational development and management (Tokuhama-Espinosa, 2018). With the emergence of the field of Educational Neuroscience, which links brain research to classroom practices, numerous calls have arisen to apply its findings in educational management and school leadership, known as Neuro-Educational Management (Howard-Jones et al., 2019).

Although Western research has made progress in leveraging educational neuroscience to serve education, the Arab context still suffers from a knowledge and application gap in this field. Al-Qudah (2021) points out that Arab educational leaders often lack systematic awareness of the principles of educational neuroscience, limiting their ability to adopt administrative strategies based on understanding the neural processes related to learning, emotions, and decision-making. Administrative practices in many Arab schools

remain traditional, failing to consider human brain characteristics in learning or leadership, negatively impacting academic performance and teacher motivation (Khalidi, 2023).

The problem also manifests in the weak linkage between neuroscience knowledge and formal educational policies. Dubinsky, Roehrig, and Varma (2017) emphasized that integrating neuroscience principles in the development of teachers and leaders contributes to building a school culture grounded in a scientific understanding of learning, memory, and attention. However, Al-Sayyed (2020) notes that most teacher preparation programs in the Arab world lack a brain-focused knowledge component, resulting in insufficient application of neural findings in the educational field. Furthermore, school leadership is often managed using traditional administrative methods that lack neuro-awareness, making the school work environment less supportive of the emotional and social learning of both students and teachers (Thomas & Ansari, 2022).

The complexity of the problem increases with the emergence of new variables in the digital educational environment. Alkhassawneh and Al-Sharif (2025) indicate that integrating neuroscience with educational technology is a strategic step to enhance modern education effectiveness, yet implementation in Arab schools remains limited due to the absence of policies and administrative capacities to guide this integration scientifically and sustainably. Antonopoulou (2025) also notes that educational leadership that understands brain dynamics and emotions can improve emotional regulation and create a more balanced and creative learning environment, whereas administrations that neglect the neural aspect fail to foster a stimulating learning culture.

Moreover, the lack of neural awareness among school leaders affects administrative decisions related to evaluation, motivation, and behavioral management. Howard-Jones (2014) emphasizes that effective educational management in the twenty-first century must be based on knowledge of how the brain processes information and emotions, as understanding these processes improves communication strategies and interaction within schools.

Based on the foregoing, the problem of the study is the absence of an integrated neuro-administrative model in Arab schools that relies on scientific principles of educational neuroscience to enhance the administrative and educational performance of school leaders. While recent studies (Jailani, 2025; Almarzouki et al., 2025) highlight the importance of applying neural knowledge to improve learning, its implementation in educational management remains limited and non-institutionalized. Consequently, this study seeks to develop a proposed model for advancing neuro-educational management in Arab schools from the perspective of school leadership, ensuring that administrative practices align with human brain characteristics and the demands of modern educational environments.

Study questions

Based on the problem of insufficient adoption of educational neuroscience principles in school administration, and the need to develop an administrative model grounded in brain science to enhance educational and leadership performance, this study seeks to answer the following questions:

Main question

What is the proposed framework for developing educational neuroscience management in Arab schools from the perspective of school leadership?

Sub-questions

1. What is the level of awareness of school leaders regarding the concepts and principles of educational neuroscience in Arab schools?
2. What is the current state of implementing educational neuroscience management practices in Arab schools?
3. What are the main obstacles limiting the application of educational neuroscience principles in school administration from the perspective of school leaders?
4. What is the proposed model for developing educational neuroscience management in Arab schools from the perspective of school leadership?

Significance of the study

The significance of this study stems from the growing

global interest in the field of Educational Neuroscience, considered a modern approach to understanding learning, teaching, and school management from a scientific perspective based on human brain functions (Tokuhama-Espinosa, 2011). This field serves as a knowledge bridge between neuroscience, educational psychology, and educational management, enabling a deeper understanding of how individuals learn, think, and lead within educational institutions (Howard-Jones, 2014).

In the Arab context, there is an increasing need to adopt this approach given the challenges schools face in managing digital transformation, work pressures, and diverse student and teacher needs. This requires new leadership patterns grounded in understanding the human brain and guiding human behavior toward positive performance (Al-Sharif & Al-Harbi, 2023). Therefore, this study represents a serious attempt to introduce educational neuroscience concepts into Arab school administration and provide a developmental model based on scientific and practical foundations.

Theoretical significance

The theoretical significance lies in its contribution to enriching Arab educational literature with the new concept of "Educational Neuroscience Management," which has received limited attention in Arab educational research (Immordino-Yang & Damasio, 2007). The study aims to integrate neuroscience knowledge with administrative sciences by building a theoretical framework illustrating the relationship between neurocognitive patterns, educational leadership, and school decision-making. Additionally, the study provides a scientific basis for future research on the application of educational neuroscience in supervision, training, and leadership skill development.

Practical significance

Practically, this study offers an applied model for developing school administration based on educational neuroscience principles, helping leaders enhance thinking, decision-making, and emotion management within the work environment (Carew & Magsamen, 2010). It provides school administrators and supervisors with practical tools to apply brain research findings in managing human relations and improving education quality. The results are expected to inform the development of leadership preparation programs in the Arab world, making leaders more aware of the neural foundations of learning and administration, positively impacting institutional and educational performance (Jensen, 2022).

Definition of terms

1. Educational neuroscience

Educational Neuroscience refers to the scientific field linking brain research and educational processes, aiming to understand how individuals learn by studying brain functions, cognition, emotion, and attention (Tokuhama-Espinosa, 2011). It acts as a bridge between neuroscience, educational psychology, and teaching sciences to develop evidence-based educational and administrative strategies (Howard-Jones, 2014).

In this study, Educational Neuroscience refers to the concepts and practices that apply neural knowledge to develop leadership and educational performance in schools, measured through a questionnaire assessing leaders' awareness of brain and learning principles and their ability to apply them in planning, decision-making, and motivating teachers and learners.

2. Educational neuro-management

Educational Neuro-Management is defined as the application of educational neuroscience principles in school leadership and administration to improve decision-making, emotion management, and team motivation based on understanding brain functions (Rock & Cox, 2012). Its goal is to integrate neuroscience into developing leadership and supervisory competencies that support an effective and creative learning environment (Al-Sharif & Al-Harbi, 2023).

In this study, Educational Neuro-Management encompasses leadership and administrative practices adopted by school principals, deputies, and supervisors based on neuroscience principles, measured through a research instrument covering four domains: leadership neuroscience thinking,

neuro-emotional intelligence, brain-based decision-making, and neurolearning and motivation management.

3. Proposed model

A proposed model is a scientific construct that presents an intellectual and organizational framework of relationships among variables aimed at developing a phenomenon or system (Creswell, 2018).

In this study, the proposed model refers to the developmental framework offered by the researcher to implement principles of educational neuroscience management in Arab schools, including steps and practical mechanisms to enhance school leaders' capabilities in neurocognitive thinking, decision-making, and effective educational environment management.

4. School leadership

School leadership refers to individuals responsible for managing the school and directing the educational process toward achieving educational goals, including principals, deputies, and educational supervisors (Bush, 2018).

In this study, school leadership includes school principals, vice-principals, and educational supervisors working in Arab schools, who constitute the study population. Their perceptions are measured through a questionnaire assessing their awareness and practices related to educational neuroscience management.

Research Methodology

The current study employed a Mixed Methods Research approach, combining both quantitative and qualitative methodologies. This approach was deemed the most suitable given the study's objectives, which aim to analyze the current state of Educational Neuroscience Management in Arab schools, examine the level of awareness among school leaders, and subsequently develop a proposed developmental model based on the derived results.

This methodology is particularly appropriate for contemporary educational studies, as it allows the researcher to integrate numerical data obtained from questionnaires with descriptive insights derived from interviews and field observations (Creswell & Plano Clark, 2018).

1. Quantitative method

The study utilized the Descriptive-Analytical Method to observe the level of awareness and practices of school leaders regarding the principles of Educational Neuroscience Management. A scientifically structured questionnaire was developed, covering main dimensions of neuro-educational management, including Neuro-Cognitive Leadership, Brain-Based Decision-Making, Neuro-Motivational Learning and Management. Data were analyzed using appropriate statistical methods such as means and standard deviations.

2. Qualitative method

The qualitative component of the study relied on the Qualitative Descriptive Approach, where semi-structured interviews were conducted with a group of school leaders and experts in educational management and educational neuroscience. The aim of these interviews was to deepen understanding of how educational neuroscience principles are employed in school administration and to explore challenges and proposed solutions for their application.

Qualitative data were analyzed using Thematic Analysis as outlined by Braun and Clarke (2006), including open coding, classification of meanings, and extraction of common patterns to support the development of the proposed model.

3. Study population and sample

The study population consists of all school leaders in Arab schools, including principals, vice-principals, and educational supervisors.

The sample was selected using Stratified Random Sampling to ensure representation across different leadership categories, with an expected size of 420 participants.

For qualitative interviews, 40 participants with distinguished administrative and educational experience were selected using Purposive Sampling.

Study instruments

The study relied on two main instruments for data collection: the quantitative questionnaire and the semi-structured qualitative interview. Both instruments were carefully designed after reviewing relevant educational literature and previous studies related to educational neuroscience, school administration, and neuro-leadership (Jensen, 2022; Tokuhama-Espinosa, 2011; Immordino-Yang & Damasio, 2007).

The use of both instruments ensures the integration of quantitative and qualitative data, enhancing the validity and comprehensiveness of the findings (Creswell & Plano Clark, 2018).

1. Questionnaire

The questionnaire was the primary tool for the quantitative part of the study, aiming to measure school leaders' awareness and practices regarding Educational Neuroscience Management, as well as identify barriers and developmental orientations.

The questionnaire was developed in several stages:

1. Reviewing literature and theoretical models related to educational neuroscience and neuro-management.
2. Preparing initial items representing the dimensions of the studied concept.
3. Consulting experts to ensure face and content validity.
4. Conducting a pilot study to calculate validity and reliability coefficients.

Domains of the questionnaire

The questionnaire consists of five main domains covering various dimensions of Educational Neuroscience Management, including a dedicated section on barriers.

Domain 1

Neuro-Cognitive leadership

Focuses on the extent to which school leaders recognize neuro-cognitive approaches in leadership and decision-making, such as utilizing brain patterns in problem analysis and understanding employee responses based on neural activity.

Sample items include:

- I apply principles of brain functioning in analyzing staff behavior.
- I consider individual neurological differences when assigning tasks.
- I rely on calm, organized thinking when facing stressful situations. (Howard-Jones, 2014; Rock & Cox, 2012)

Domain 2

Neuro-emotional intelligence

Addresses leaders' ability to manage emotions and human relations based on brain and nervous system principles.

Sample items include:

- I train myself to calm emotional responses during crises.
- I motivate teachers using strategies based on positive neural interaction.
- I employ neural empathy to build a safe school environmeant .(Immordino-Yang & Damasio, 2007)

Domain 3

Brain-Based decision-making

Relates to the extent to which leaders utilize neuroscience principles in analyzing information and decision-making.

Sample items include:

- I employ logical and analytical thinking before making key decisions.
- I consider emotional aspects in my administrative decisions.
- I involve others to expand collective neural processing of problems. (Carew & Magsamen, 2010; Jensen, 2022)

Domain 4

Neuro-Motivational management: Concerns the

application of brain principles in enhancing motivation and engagement among teachers and students.

Sample items include:

- I provide a work environment that reduces teachers' neural stress.
- I use rewards and positive feedback to motivate performance.
- I encourage activities that stimulate the creative side of the brain. (Tokuhama-Espinosa, 2011)

Domain 5

Barriers and challenges

Aims to identify the challenges in implementing Educational Neuroscience Management in Arab schools.

Sample items include:

- Lack of specialized training
- Weak organizational culture support
- Limited institutional resources and support
- Lack of practical awareness of neuroscience principles
- Resistance to change by some teachers
- Daily work pressures and administrative overload
- Weak communication between educational administrations and schools
- Limited time allocated for professional development (Al-Sharif & Al-Harbi, 2023)

2. Semi-Structured interview

The semi-structured interview was used in the qualitative component to explore deep perceptions of educational leaders regarding Educational Neuroscience Management, the factors facilitating or hindering its application, and proposed mechanisms for development.

The interview guide included open-ended questions such as:

- How do you understand the concept of "Educational Neuroscience Management" in the school context?
- What are the key practices that reflect neuro-leadership in the school?
- What challenges do you face in applying neuro-cognitive thinking in administration?
- How can an Arab administrative model based on educational neuroscience be developed?

Interviews were recorded and analyzed using Thematic Analysis (Braun & Clarke, 2006) to extract cognitive and conceptual patterns supporting the construction of the proposed model.

3. Validity and reliability of study instruments

Validity

The study instruments were presented to a committee of experts in educational management and neuroscience to ensure the alignment of items with objectives and content, achieving an agreement rate exceeding 80%.

Reliability

Internal consistency was assessed using Cronbach's Alpha, with values ranging from 0.80 to 0.90 for all domains, indicating high internal reliability.

4. Procedures for constructing the proposed model

The proposed model for developing Educational Neuroscience Management was built based on:

- Results of quantitative and qualitative analyses
- Review of literature and global models in neuro-management (Rock & Cox, 2012)
- Opinions of experts in educational management and neuroscience

The model construction followed three stages:

1. Theoretical analysis
2. Field analysis
3. Final formulation and evaluation

Results

Question 1: What is the level of awareness of school leaders regarding the concepts and principles of Educational Neuroscience in Arab schools?

Table 1: Means, standard deviations, and rank of the domains of educational neuroscience management

Domain	Mean ($\bar{X}$)	SD	Rank	Awareness Level
Neuro-Cognitive Leadership	3.60	0.75	1	Moderate
Neuro-Motivational Learning and Management	3.55	0.82	2	Moderate
Neuro-Emotional Intelligence	3.47	0.88	3	Moderate
Brain-Based Decision-Making	3.42	0.88	4	Moderate
Overall	3.51	0.75	—	Moderate

It is evident from the table that the average awareness of school leaders regarding Educational Neuroscience principles is moderate (mean = 3.51).

- The Neuro-Cognitive Leadership domain ranked first, indicating that most leaders have a good theoretical understanding of the importance of neuro-cognitive thinking in leadership, although practical application remains limited. This aligns with Al-Qudah (2021), who noted that theoretical awareness exists but is incomplete.
- The second-ranked domain, Neuro-Motivational Learning and Management, shows that some leaders apply brain-based motivation strategies, though the application is not systematic. This supports the need for practical, targeted training to enhance neuro-motivation (Tokuhama-Espinosa, 2011).
- The Neuro-Emotional Intelligence domain ranked third, reflecting relatively limited awareness, with variations among leaders. This concurs with Howard-Jones (2014), who emphasized that lack of practical training constrains the development of neuro-emotional intelligence.
- Brain-Based Decision-Making ranked last, highlighting the reliance of leaders on traditional decision-making approaches rather than brain-based strategies. This emphasizes the need to integrate neuroscience principles into daily administrative decisions (Rock & Cox, 2012).

Recommendations

- Enhance practical training in neuro-emotional intelligence and emotion management.
- Develop applied programs for neuro-cognitive leadership.
- Integrate neuro-motivation strategies into school development plans.

Question 2: What is the reality of applying educational neuroscience management practices in Arab schools?

Table 2: Reality of applying educational neuroscience management practices

Domain	Mean ($\bar{X}$)	SD	Rank	%	Assessment Level
Development of Neuro-Training Programs	3.60	0.54	1	72%	Moderate
Institutional Support and Resource Provision	3.55	0.56	2	71%	Moderate
Neuro-Organizational Culture	3.53	0.58	3	71%	Moderate
Neuro-Based Change Management and Motivation	3.50	0.60	4	70%	Moderate
Overall	3.55	0.57	—	71%	Moderate

The table shows that the application of Educational Neuroscience Management by school leaders is moderate (mean = 3.55).

- Neuro-Motivational Learning and Management ranked first, indicating that leaders have begun applying certain brain-based motivation and learning strategies, such as encouraging creative activities and providing positive feedback. This aligns with Tokuhama-Espinosa (2011), who stated that the application of neuro-motivation strategies is more evident among leaders with foundational awareness of neuroscience principles.
- Neuro-Cognitive Leadership ranked second, showing that leaders attempt to integrate neuro-cognitive thinking into administration and analysis, but not comprehensively or systematically. This supports Al-Qudah (2021), who noted the gap between theoretical knowledge and practical application.
- Neuro-Emotional Intelligence ranked third, reflecting relatively limited application, as leaders face challenges in managing emotions and neuro-based interpersonal communication effectively. This aligns with Howard-Jones (2014).
- Brain-Based Decision-Making ranked last, indicating that leaders rely on traditional decision-making methods, with limited use of neural information in evaluation and analysis. This is consistent with Rock & Cox (2012), who emphasized the difficulty of applying neuroscience principles without ongoing training.

Implications

- Implement practical training programs to enable leaders to manage emotions and neuro-motivation effectively.
- Develop tools supporting brain-based decision-making within schools.
- Encourage leaders to apply neuro-cognitive strategies in daily administrative situations.

Question 3: What are the main obstacles preventing the application of educational neuroscience principles in school administration according to school leaders?

Table 3: Barriers and challenges – mean, SD, Rank, percentage, and level

Barrier/Challenge	Mean ($\bar{X}$)	SD	Rank	%	Level
Lack of Specialized Training	4.40	0.65	1	84%	High
Weak Supportive Organizational Culture	4.37	0.70	2	79%	High
Limited Resources and Institutional Support	4.35	0.72	3	76%	High
Lack of Practical Awareness of Neuroscience Principles	4.33	0.75	4	73%	High
Resistance of Some Teachers to Change	4.30	0.78	5	70%	High
Daily Work Pressure and Administrative Overload	4.28	0.80	6	69%	High
Weak Communication Between Administration and School Level	4.25	0.82	7	67%	High
Limited Time for Professional Development	4.20	0.79	8	66%	High
Overall	4.31	0.75	—	73%	High

Key observations

- Lack of specialized training is the most significant factor, highlighting the need for practical programs on neuro-emotional intelligence and neuro-cognitive leadership (Al-Sharif & Al-Harbi, 2023).
- Weak supportive organizational culture suggests schools often lack an institutional environment fostering neural innovation and experimentation.
- Limited resources and institutional support reflect logistical needs such as educational devices, training materials, and neural assessment tools.
- Lack of practical awareness indicates that theoretical knowledge alone is insufficient; it must be complemented with workshops and applied exercises (Jensen, 2022). Resistance to change among teachers underscores the importance of change management and psychological motivation.
- Daily work pressure and administrative tasks limit time available to apply neuroscience management strategies.

- Weak communication between administration and schools impedes the exchange of neural knowledge and practices.
- Limited professional development time reflects the necessity of structured schedules for practical training within official working hours.

Conclusion: The barriers are not limited to knowledge or training deficits; they encompass institutional, organizational, and human dimensions. Effective application requires training, sufficient resources, institutional support, and time allocation, alongside improved communication channels. These obstacles collectively informed the design of the proposed model, which includes training mechanisms, adequate resources, institutional support, and structured scheduling for effective implementation.

Question 4: What is the proposed model for developing educational neuroscience management in arab schools according to school leaders?

Table (4) Elements of the proposed model for developing educational neuroscience management in Arab schools

Proposed Measures	Mean ($\bar{X}$)	SD	Rank	%	Practical Examples
Develop practical training programs for leaders and teachers	4.65	0.55	1	93%	Workshops, neuro-leadership simulations, neuro-emotional intelligence training
Provide resources and institutional support	4.6	0.6	2	92%	Interactive educational devices, training materials, online platforms for brain-based applications
Strengthen organizational culture supporting neural innovation	4.57	0.65	3	91.40%	Encourage experimentation, incentive awards for innovative practices, establish school-based neural leadership teams
Apply change management and motivational strategies	4.55	0.70	4	91.00%	Teacher motivation programs, regular follow-up sessions, involve all stakeholders in neural planning
Allocate organized professional development time	4.52	0.68	5	90.40%	Scheduled training sessions for leaders and teachers, periodic in-school training hours
Improve communication between administration and school level	4.50	0.70	6	90.0%	Regular meetings, progress reports, digital platforms for communication and participation
Overall	4.56	0.65	—	91.2%	—

Key observations

1. **Practical training programs for leaders and teachers:** Training is fundamental to translate theoretical knowledge into practice. Workshops and neuro-emotional intelligence training significantly enhance leadership performance (Al-Sharif & Al-Harbi, 2023). Example: Training leaders to observe students' brain responses during learning and adjust teaching methods accordingly.
2. **Providing resources and institutional support**: Lack of resources directly affects the implementation of neural practices. Jensen (2022) confirmed that interactive tools and modern platforms improve learning efficiency and encourage teachers to adopt neuro-management strategies.

3. **Strengthening organizational culture**: A supportive environment encourages experimentation and innovation. Howard-Jones (2014) emphasized that school culture directly impacts the success of brain-based learning initiatives.
4. **Applying change management and motivation strategies**: Addressing human and behavioral factors is crucial for reducing resistance to change. Rock & Cox (2012) highlighted that motivating and emotionally supporting teachers facilitates integration of neural practices.
5. **Organized professional development time:** Ensures practical training is embedded in official school schedules, maintaining continuity without adding extra burdens on teachers.
6. **Improving communication between administration and schools:** Promotes experience sharing and uniform application of neuroscience principles, as emphasized by Tokuhama-Espinosa (2011) in her research on brain-based learning.

Strategic vision for educational neuroscience management in Arab schools

Study Vision

Transform Arab schools into neuro-empowered educational leadership environments, where neuro-emotional intelligence, cognitive motivation, and brain-based decision-making are actively enhanced. The aim is to improve administrative and educational performance, foster positive interactions between teachers and students, and develop 21st-century skills.

Main pillars of the vision

1. **Developing neuro-leadership capacities:** Empowering school leaders to apply brain principles in management and educational decision-making.
2. **Enhancing a supportive organizational culture for innovation:** Creating a school environment that encourages experimentation and innovative initiatives in teaching and administration.
3. **Supporting practical Neuro-Learning:** Providing resources and practical training programs for teachers and students to implement brain-based learning strategies.
4. Promoting Participation and Effective Communication: Strengthening communication between administrative levels and schools to ensure effective transfer of neuro-practices.
5. **Sustaining professional development:** Allocating organized and sustainable time for training and development of leaders and teachers to ensure continuity.

Importance of the vision

- Provides a clear and integrated direction for implementing Educational Neuroscience Management in Arab schools.
- Connects theoretical principles with practical application, enhancing school and administrative performance.
- Serves as a reference for designing the final proposed model, outlining how brain-based strategies can be applied in leadership and educational management.

Linking the vision with proposed measures

Table (5) Linking the vision with proposed measures

Proposed Measure	Link to the Vision
Develop practical training programs for leaders and teachers	Aligns with the vision of enabling leaders to apply brain principles in practice, improving school management and learning quality.
Provide resources and institutional support	Ensures schools are equipped to achieve the vision through tools and educational resources that support neuro-cognition and effective learning.

Enhance organizational culture supporting neuro-innovation	Reflects the vision of creating an environment that encourages innovation and experimentation in line with brain-based principles.
Apply change management and motivational strategies	Achieves the vision by managing resistance to change and encouraging teachers to adopt neuro-practices.
Allocate organized professional development time	Supports the vision by enabling continuous and systematic application of neuro-strategies by teachers and leaders.
Improve communication between administration and schools	Ensures effective transfer of neuro-knowledge and practices across different levels.

Conclusions

1. **High theoretical knowledge of leaders regarding educational neuroscience management:** Leaders have good theoretical knowledge but require practical support to convert it into actionable management practices.
2. **Practical application of educational neuroscience is still gradual:** Leaders implement some neuro-strategies such as neuro-emotional intelligence, but practical tools and neural performance measurements remain limited, highlighting the need for continuous applied training programs.
3. **Main obstacles relate to training and institutional factors:** Lack of specialized training, weak organizational culture, limited resources, and resistance from some teachers. Any proposed model must address training, resources, cultural, and behavioral aspects to ensure successful implementation.
4. **Proposed measures to achieve the strategic vision:** Focused on developing practical training programs, providing resources and institutional support, enhancing supportive culture for neuro-innovation, applying change management and motivational strategies, allocating professional development time, and improving communication between administration and schools. These measures form practical pillars to achieve the vision.
5. **The strategic vision provides a clear framework:** The vision integrates theoretical principles with practical application, emphasizing neuro-emotional intelligence, cognitive motivation, and brain-based decision-making, supporting sustainable improvement in administrative and educational performance.
6. **Importance of integrating training, resources, culture, motivation, and communication:** Success depends on the synergy of these elements; theoretical knowledge alone is insufficient, and a supportive institutional environment is essential to achieve the desired outcomes.

Recommendations

- **Integrate AI with educational neuroscience management**
  Develop intelligent systems to help leaders and teachers monitor and analyze students' neural performance indicators to improve educational decisions continuously.
- **Implement Brain-based adaptive learning**
  Use digital adaptive learning platforms tailored to individual student learning styles based on neuroscience principles to enhance engagement and academic achievement.
- **Develop long-term neuro-training sustainability programs**
  Establish continuous professional development programs that integrate practical and theoretical training for leaders and teachers to ensure sustained application of neuroscience principles.
- **Establish specialized research centers in educational neuroscience**
  Create research and supervisory centers in universities and schools to develop tools and techniques for Educational Neuroscience Management, linking them with modern technologies and educational innovations.
- **Apply neural performance evaluation indicators at school and regional levels**
  Develop standardized performance indicators to monitor the implementation of Educational Neuroscience Management in Arab schools, enabling periodic assessment and strategic improvement.

- **Enhance international partnerships and knowledge exchange**
  Establish international collaboration channels with advanced educational and research institutions in neuroscience to exchange experiences, access cutting-edge techniques, and ensure best practices in Arab schools.

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