

Brain-Based Learning in the Teaching of Arabic to Native Speakers: Theoretical Foundations and Classroom Applications

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Abstract:

This article aims to explore the concept of Brain-Based Learning (BBL) and its potential applications in the teaching of Arabic to native speakers. This study reviews the theoretical foundations of brain-based learning, drawing on the latest research in cognitive neuroscience and educational psychology, and presents core principles such as integrated brain processing, conscious and unconscious learning, the importance of the search for meaning and patterns, the role of emotions, the balance between challenge and relaxation, and the consideration of individual differences. On the basis of these principles, the article proposes a set of classroom strategies and applications for teaching Arabic, including the design of integrated curricula; the use of interactive and stimulating teaching strategies (such as cooperative learning, projects, mind maps, stories, drama, and movement-based learning); the provision of a rich learning environment; a focus on metacognitive skills; and the delivery of constructive and immediate feedback. The article also presents proposed analytical findings on the impact of implementing this approach, anticipating improvements in language acquisition, increased motivation and participation, and the development of higher-order cognitive skills. The article concludes with a discussion of the challenges and future opportunities for implementing brain-based learning in the context of teaching Arabic.

Keywords: Brain-based learning, teaching Arabic, native speakers, theoretical foundations, classroom applications, language acquisition.

Introduction:

The teaching of Arabic to native speakers is a fundamental pillar for preserving cultural and linguistic identity, as well as for developing communicative and intellectual capacities. With rapid advances in our understanding of human brain function, the concept of Brain-Based Learning (BBL) has emerged as a promising approach for enhancing the effectiveness of the educational process. This theory is grounded in recent research in the field of cognitive neuroscience, which reveals how the brain processes information, forms memories, and develops skills (ZareNejad et al., 2023) [1]. The application of these principles in the context of teaching Arabic to native speakers can bring about a qualitative transformation in teaching methods and learning outcomes.

The need for innovative and effective instructional strategies is growing in light of the challenges facing the teaching of Arabic, including the decline in interest in the language, its influence by foreign languages, and the need to develop higher-order thinking skills among learners. Brain-based learning provides a theoretical and applied framework through which it is possible to design learning environments that stimulate the brain for optimal learning, take into account individual differences among learners, and cultivate their communicative, critical, and creative thinking skills (Basal, 2020) [2]; (Hilmi, 2021) [3].

This article aims to present a comprehensive study of brain-based learning in the teaching of Arabic to native speakers by reviewing its underlying theoretical foundations, proposing suggested classroom applications, and analysing the expected results of adopting this approach. The article will first address the theoretical framework of brain-based learning, presenting its key principles and how they relate to brain functions. It will then move to the applied framework, where it will present instructional strategies and learning activities that can be employed in Arabic language classrooms. Finally, the article will offer proposed analytical findings on the impact of applying this approach to Arabic language skills and learners' motivation, together with a discussion of future challenges and opportunities.

Theoretical framework:

1- The scientific foundations of brain-based learning

Brain-Based Learning (BBL) is a comprehensive educational model based on a profound understanding of how the human brain functions and processes information. This concept emerged from the intersection of cognitive neuroscience, psychology, and education to design learning environments and teaching strategies that are in harmony with the biological and neural processes of learning (ZareNejad et al., 2023) [1]. The application of BBL principles in teaching Arabic to native speakers offers an opportunity to enhance the effectiveness of learning and to develop language skills more deeply and sustainably.

The theory of brain-based learning is grounded in a set of fundamental principles that inform educational practices. These principles are not merely pedagogical recommendations but conclusions derived from scientific research on the structure and functions of the brain. Among the most prominent of these principles are:

1-1- The brain as an integrated and parallel processor

The brain is characterised by its exceptional capacity to process information in an integrated and parallel manner, with multiple regions of the brain operating simultaneously to process different aspects of the learning experience (Basal, 2020) [2]. This means that learning is not a linear or fragmented process but rather a complex network of neural interactions that integrates cognitive, emotional, sensory, and motor dimensions. For example, when learning a new word in Arabic, the process is not limited to memorising its meaning and spelling; it also involves linking it to mental images, particular emotions, or multiple contexts of use. Therefore, learning environments should provide opportunities for holistic learning that integrates these various dimensions rather than focusing on only one aspect. This requires the design of instructional activities that stimulate both hemispheres of the brain and integrate logical and creative thinking, as well as analysis and synthesis.

1-2- Conscious and unconscious learning (peripheral perception)

The learning process involves both focused attention and peripheral perception and encompasses conscious and unconscious operations (Hilmi, 2021) [3]. The brain is constantly learning from the surrounding environment, even when the individual is not directly focused on a particular task. Peripheral perception refers to the brain's reception of information from the environment without full awareness, and this information can influence learning and behaviour. In the context of teaching Arabic, this principle can be applied by creating a classroom environment rich in linguistic stimuli, such as posters featuring Arabic vocabulary or phrases, maps of Arab countries, or soft Arabic music in the background. These visual and auditory stimuli contribute to building an unconscious knowledge base of the language, thereby enhancing continuous exposure to the language and making it a natural part of the learner's environment. Colors, shapes, and scents can also be used to create a stimulating educational atmosphere that positively affects the learner's emotional state and, consequently, their ability to learn.

1-3- The search for meaning

The brain is innately designed to seek meaning and establish connections between new information and prior knowledge. The brain cannot learn effectively if the information presented is abstract, irrelevant to the learner's experiences, or disorganized (ZareNejad et al., 2023) [1]. When the brain finds meaning in information, it connects it to existing neural networks, which facilitates its assimilation and recall. Therefore, instructional materials must be meaningful to learners, linked to their daily lives and interests, and presented in meaningful contexts. In Arabic teaching, this can be achieved through the following:

- Linking content to reality: using authentic texts and real-life situations that reflect students' experiences or interests, such as everyday dialogues or short stories that address relevant social or cultural issues.
- Problem-based learning: presenting problems or challenges that require the use of Arabic to solve them, thereby making learning purposeful and meaningful.

- Exploring Arab culture: encouraging students to explore Arab culture through language, for example, by reading literary texts, watching documentaries, or listening to Arabic songs, which adds a cultural and value-laden dimension to learning.
- Connecting with prior knowledge: Activating students' prior knowledge and linking it to new linguistic information, which helps build strong cognitive bridges.

1-4- The search for patterns

The brain naturally tends to search for patterns and organisation in information. When information is presented in an organised manner with clear patterns, learning becomes easier and more effective, as this helps the brain construct well-structured cognitive frameworks (Basal, 2020) [2]. This principle supports the use of visual and organisational tools in the educational process. In Arabic teaching, this principle can be applied through the following steps:

- Organising grammatical and morphological rules: presenting grammatical and morphological rules in clear and simplified patterns, such as tables, charts, or mind maps, that illustrate the relationships between the different components of the rule.
- Classifying vocabulary: Organising vocabulary according to themes, semantic fields, or lexical roots, which facilitates its memorisation and retrieval.
- Charts and diagrams are used to clarify the relationships between words and sentences, the sequence of events in a story, or the structure of a text by means of charts and diagrams.
- Identifying phonological and rhythmic patterns: This study focuses on phonological and rhythmic patterns in Arabic, such as tajwīd in Qur'anic recitation or poetic metres, which helps to develop students' linguistic sensitivity.

1-5- Emotions and learning

Emotions play a critical role in the processes of learning and memory. Educational environments that evoke positive emotions, such as joy, curiosity, and a sense of safety, enhance learning and help consolidate information in long-term memory. In contrast, negative emotions, such as fear, stress, and frustration, can hinder learning by activating the brain's "fight or flight" response, thereby reducing the capacity to concentrate and process information (ZareNejad et al., 2023) [1]. Therefore, teachers must create a safe and supportive classroom environment, encourage positive interaction among students, and use enjoyable and stimulating activities that arouse curiosity and make learning an enjoyable experience. In Arabic teaching, the following can be used:

- Interactive language games: designing educational games that focus on vocabulary, grammar, or pronunciation, making learning enjoyable and interactive and reducing stress.
- Engaging stories: using short stories or Arab folk tales that stimulate curiosity and develop imagination, thereby linking learning with positive emotions.
- Creative activities: encouraging students to express themselves in Arabic through drawing, singing, or acting, which enhances their self-confidence and reduces their fear of making mistakes.
- Positive reinforcement: providing praise and encouragement to students for their efforts and progress, which strengthens their motivation and creates a positive atmosphere in the classroom.

1-6- Learning through challenge and relaxation (conscious relaxation)

The brain needs a precise balance between challenge and relaxation for effective learning. When the brain encounters challenges that are appropriate to its level, it becomes activated and develops new neural connections, resulting in cognitive growth. However, excessive stress or inappropriate challenges can hinder learning and lead to

exhaustion. Therefore, learning environments should provide challenges that are suited to the learner level while offering opportunities for relaxation and reflection to consolidate learning (ZareNejad et al., 2023) [1]. This principle, also known as conscious relaxation, highlights the importance of breaks and reflection in the learning process. In Arabic teaching, this can be achieved through the following:

- Graduated language tasks: providing language tasks that challenge students but remain attainable, with the level of difficulty increasing gradually.
- Short breaks: Short, structured breaks during long lessons are provided to allow the brain to process information and relax.
- Reflective activities: encouraging students to engage in self-reflection on their learning process and to think about what they have learned and how they can improve their performance.
- Relaxation techniques: simple relaxation techniques, such as deep-breathing exercises, are used to reduce stress and increase concentration.

1-7- Individual differences

Each brain is unique and processes information in its own way. This means that learners have different learning styles, multiple intelligences, and respond to different teaching strategies (Hilmi, 2021) [3]. Therefore, teachers should employ a variety of teaching and assessment methods that meet the needs of all learners and consider their individual differences. In Arabic teaching, this principle can be applied through the following steps:

- Presenting content in multiple forms: a variety of instructional materials (visual, auditory, kinesthetic, reading, and writing) are used to cater to different learning styles.
- Providing options for students: allowing students to choose activities or tasks that suit their learning styles and interests.

- Differentiated learning: providing individual support for learners who encounter difficulties and offering enrichment activities for advanced learners.
- Various assessments: diverse assessment methods (oral, written, practical, and project-based) are used to evaluate students' understanding and progress comprehensively.

These principles demonstrate that brain-based learning is not merely a set of techniques but also a comprehensive educational philosophy that places an understanding of the brain at the heart of the educational process. By adopting these principles, teachers can design more effective and engaging learning experiences for Arabic language learners.

Applied framework:

2- Classroom strategies for teaching Arabic to native speakers

Drawing on the theoretical foundations of brain-based learning, it is possible to develop a set of practical classroom strategies and applications for teaching Arabic to native speakers. These applications aim to stimulate the brain for optimal learning, enhance linguistic skills, and foster learners' critical and creative thinking while taking into consideration the unique characteristics of the Arabic language and its culture.

2-1- Designing integrated and interconnected curricula

Curricula should focus on engaging the whole brain and presenting content in diverse ways that stimulate curiosity and cater to different learning styles. Activities that require critical thinking, problem solving, and creativity can be integrated to promote the active processing of information (ZareNejad et al., 2023) [1]. Instead of concentrating on memorising grammatical and morphological rules in isolation from context, it is possible to design instructional units that integrate these rules with authentic literary texts, real-life situations, or contemporary cultural issues. This approach makes learning more meaningful and holistic, helping the brain establish strong connections between different areas of linguistic knowledge. For example, rules of i'rāb can be taught through the

analysis of a poem, or new vocabulary can be taught within the context of a short story or a dialogue representing an everyday situation.

2-2- Interactive and stimulating teaching strategies

Teachers should employ a wide range of strategies that are consistent with the principles of brain-based learning and that encourage active participation and evoke positive emotions:

- **Cooperative learning:** encouraging group work and discussion to enhance social and emotional interaction, which is one of the confirmed principles of brain-based learning (ZareNejad et al., 2023) [1]. Students can work in small groups to solve complex linguistic problems, write joint creative texts, or conduct dialogues and debates in Arabic on topics of interest to them. This strengthens oral and written communication skills, as well as collaboration skills, and reduces anxiety associated with language use.
- **Project-based learning:** Engaging students in practical projects that require the application of Arabic language skills in real and meaningful contexts, thereby enhancing active processing and deep understanding. Students can prepare presentations on historical Arab figures, produce class magazines addressing societal issues, or perform short plays in Arabic that reflect aspects of Arab culture. Such projects provide students with opportunities to use the language in creative and practical ways and develop their research, organisation, and presentation skills.
- **Mind maps and visualisation:** Mind maps and charts are used to organise information and facilitate its comprehension and recall, as the brain processes parts and wholes simultaneously (Basal, 2020) [2]. Students can use mind maps to summarise long texts, organise new vocabulary according to semantic categories, or clarify the relationships between main ideas in a given topic. Charts can also be used to illustrate complex grammatical structures or the sequence of events in a story, helping to transform abstract information into visual images that are easier to remember.

- **Stories and language games:** Integrating stories and games to increase motivation and evoke positive emotions, thereby enhancing unconscious learning and making the process more enjoyable and engaging. Educational games can focus on vocabulary, grammar, pronunciation, or even games that require rapid thinking in Arabic. Stories, whether heard or read, help build vocabulary and develop reading and listening comprehension within an enjoyable and indirect context.
- **Drama and simulation:** using dramatic activities and the simulation of real-life situations to enhance speaking and listening skills and to develop self-confidence in the use of Arabic. Students can play different roles in everyday situations (such as shopping, visiting the doctor, or attending a job interview), conduct press interviews, or present news bulletins in Arabic. These activities provide a safe environment for language practice, help students overcome the fear of making mistakes, and develop their ability to express themselves fluently.
- **Movement-based learning:** Integrating movement and physical activity into the learning process, as movement enhances blood flow to the brain and improves concentration and memory. Activities that require movement can be used, such as language games that involve moving around, acting out words through bodily movements, or even standing up and stretching during short breaks.

2-3- Providing a rich and stimulating learning environment

Classrooms should be environments rich in visual and auditory stimuli, with flexible spaces for individual and group learning. Technology can be used to create interactive virtual learning environments (Hilmi, 2021) [3]. For example, the classroom can be decorated with posters containing Arabic phrases, maps of the Arab world, or images that reflect the richness of Arab culture. Interactive whiteboards, computers, tablets, and the internet can also be utilised to provide a range of interactive learning resources, including educational videos, language applications, and websites offering content in Arabic. The classroom environment should be comfortable and safe, encourage exploration and

experimentation, and provide quiet spaces for concentration and dynamic spaces for group work.

2-4- Focusing on metacognitive skills and reflection on learning

The ability of students to think about, monitor, and regulate their own learning processes helps them understand how they learn more effectively and adjust their strategies accordingly (ZareNejad et al., 2023) [1]. Teachers can encourage students to reflect on their learning goals, evaluate their progress, and identify the strategies that work best for them, thereby increasing their autonomy in learning and fostering a lifelong learning mindset. This can be achieved through:

- **Self-reflection:** encouraging students to write learning journals, carry out self-assessments of their linguistic performance, and reflect on their strengths and weaknesses.
- **Goal setting:** This helps students define clear and measurable learning goals and monitor their progress towards achieving these goals.
- **Strategy choice:** teaching students different learning strategies (such as strategies for reading, writing, or memorising vocabulary) and helping them select the strategies most suitable for them.
- **Peer feedback:** Students are trained to provide constructive feedback to their peers, which enhances their critical thinking skills and helps them understand performance criteria.

2-5- Constructive and immediate feedback

Providing immediate and specific feedback that focuses on strengths and areas for improvement helps students understand their errors and correct them effectively. Feedback should be positive and constructive, encouraging students to persevere and develop their skills rather than focusing solely on mistakes. Peer feedback and self-assessment can be used in addition to teacher feedback. For example, instead of merely

correcting grammatical errors, the teacher can explain the reason for the error, provide correct examples, and encourage the student to reformulate the sentence. Technology can also be used to provide immediate feedback, such as language error-correction programs or pronunciation applications that offer instant evaluation of students' performance.

3- Proposed analytical findings

The application of brain-based learning principles in teaching Arabic to native speakers has substantial potential for achieving multidimensional positive outcomes that go beyond merely improving linguistic performance to encompass cognitive, emotional, and behavioural aspects. These proposed outcomes are grounded in the theoretical understanding of how the brain functions and in applied experiments conducted in other educational contexts while taking into account the particularity of Arabic as a language and a culture.

3-1- Improving the acquisition of language skills

The adoption of brain-based learning strategies is expected to lead to a tangible improvement in the acquisition of the four language skills (listening, speaking, reading, and writing) among learners of Arabic:

- **Listening and speaking:** Through interactive and dramatic activities that simulate real-life situations, students will be exposed to rich and varied auditory materials, which will enhance their ability to comprehend spoken language and develop fluency in speaking. Focusing on the phonological and rhythmic patterns of Arabic helps improve pronunciation and oral expression.
- **Reading:** designing curricula that link texts to topics that are meaningful and of interest to students and using mind maps and visualisation to organise information will contribute to enhancing reading comprehension and developing analytical and inferential skills. Moreover, repeated exposure to authentic Arabic texts in a stimulating environment will nurture unconscious reading and expand vocabulary.

- **Writing:** Project-based and cooperative learning activities provide students with opportunities to express their ideas in writing within authentic contexts. The emphasis on constructive and immediate feedback helps them improve their skills in written expression, the organisation of ideas, and the accurate application of grammatical and morphological rules.
- **Vocabulary and grammar:** By linking vocabulary and grammar to meaningful contexts and using language games and creative activities, students are able to internalise vocabulary and rules more deeply and sustainably instead of relying on rote memorisation, which often leads to rapid forgetting.

3-2- Increasing motivation and participation

Motivation is a crucial factor in language learning. The application of brain-based learning principles is expected to lead to a significant increase in students' motivation and engagement in learning Arabic:

- **Positive environment:** Creating a safe and supportive classroom environment that is free from stress and afraid of making mistakes enhances students' self-confidence and encourages them to participate actively.
- **Meaningful learning:** When students find meaning in what they learn and see it connected to their lives and interests, their motivation to learn increases. Linking Arabic to culture, history, and contemporary issues will heighten their interest.
- **Challenge and relaxation:** Providing challenges appropriate to students' level, along with sufficient breaks, will maintain a high level of concentration and interest and prevent exhaustion or boredom.
- **Variety and creativity:** The use of diverse and innovative teaching strategies, such as games, stories, projects, and dramas, will make the learning process enjoyable and engaging and encourage students to explore the language in creative ways.

3-3- Developing higher-order cognitive skills

In addition to linguistic skills, brain-based learning is expected to contribute to the development of students' higher-order thinking skills:

- **Critical thinking and problem solving:** activities that require the analysis of texts, the resolution of complex linguistic problems, or decision-making on the basis of specific information enhance students' ability to think critically and solve problems.
- **Creativity:** encouraging students to express themselves in Arabic through creative writing, acting, or project design will strengthen their creative skills and unleash their imagination.
- **Metacognitive awareness:** The focus on skills related to thinking about learning will make students more aware of their cognitive processes, enabling them to organise their learning more effectively and to develop efficient learning strategies.

3-4- Challenges and future opportunities

Despite the promising potential of brain-based learning, some challenges may arise in its implementation in teaching Arabic to native speakers, including the following:

- **Teacher training:** Implementing this approach requires intensive training for teachers in the principles of brain-based learning and in how to translate them into effective classroom practices.
- **Curriculum development:** There is a need to develop curricula and instructional materials that are aligned with these principles and that consider the particularity of the Arabic language.
- **Resources:** Providing rich and stimulating learning environments may require additional resources (technological and material).

Nevertheless, future opportunities are considerable and include the following:

- Scientific research: **further experimental studies should be conducted to evaluate the effectiveness** of this approach in different Arabic language teaching contexts.
- **Educational innovation:** developing technological tools and applications that support brain-based learning in Arabic teaching.
- **International collaboration:** exchanging expertise and good practices with educational institutions and researchers around the world.

These proposed analytical findings suggest that brain-based learning provides a comprehensive and promising framework for enhancing the teaching of Arabic to native speakers by focusing on how the human brain functions and by designing learning experiences that align with these natural processes.

On the basis of the theoretical foundations and the proposed classroom applications of brain-based learning in teaching Arabic to native speakers, a set of expected analytical outcomes can be inferred:

3-5- Improving Arabic language skills

The application of brain-based learning principles is expected to result in a significant improvement in all Arabic language skills among native speakers. Studies have shown that this approach enhances conversational skills, fluency, and communicative competence (ZareNejad et al., 2023) [1]. It may also lead to improved orthographic and creative writing skills, as well as reading and comprehension skills, through the full engagement of the brain in the learning process (Basal, 2020) [2].

3-6- Increasing motivation and participation

Stimulating educational environments and brain-based interactive strategies increases students' motivation and participation in the learning process. When students find learning enjoyable and meaningful, they become more engaged and enthusiastic. This

leads to improved academic performance and a greater desire to learn Arabic (Hilmi, 2021) [3].

3-7- Developing habits of mind

Brain-based learning fosters the development of positive habits of mind, including critical thinking, problem-solving, creativity, and cognitive flexibility. These habits are essential not only for language learning but also for developing lifelong learning skills. Through activities that require deep thinking and practical application, students learn how to use their minds more effectively (Basal, 2020) [2].

3-8- Effectiveness in different learning environments

The principles of brain-based learning can be practical in both traditional and virtual learning environments. Studies have shown that online learning of Arabic can significantly benefit from this approach, despite the need to improve patterns of interaction to ensure a balance between right- and left-brain activity (Hilmi, 2021) [3]. Brain-based learning offers a flexible framework that can be tailored to diverse educational contexts.

3-9- Challenges of implementation and future opportunities

Despite its numerous benefits, implementing brain-based learning may face particular challenges. These challenges include the need to train teachers in the principles and strategies of this approach, to develop curricula that are aligned with these principles, and to provide the necessary educational resources. Some studies have also indicated that specific components of brain-based learning, such as conscious relaxation, are rarely incorporated into teaching curricula (ZareNejad et al., 2023) [1]. Nevertheless, these challenges present opportunities for future research and development to deepen our understanding of how to implement brain-based learning more effectively in Arabic teaching.

Conclusion:

Brain-based learning has proven to be a promising educational approach, offering a robust framework for enhancing the effectiveness of teaching Arabic to native speakers. By understanding how the human brain functions and applying principles derived from cognitive neuroscience, it becomes possible to design learning environments and teaching strategies that stimulate optimal learning. This article reviews the theoretical foundations of brain-based learning, including the brain as an integrated processor, conscious and unconscious learning, the importance of searching for meaning and patterns, the role of emotions, the balance between challenge and relaxation, and the consideration of individual differences.

The article has also presented a set of proposed classroom applications for teaching Arabic, such as designing integrated curricula; using interactive teaching strategies such as cooperative and project-based learning, mind maps, stories, language games, drama, and simulation; providing a rich and stimulating learning environment; focusing on metacognitive skills; and offering constructive and immediate feedback. The proposed analytical findings indicate that adopting this approach can lead to improved Arabic language skills, increased motivation and participation, the development of positive habits of mind, and effective learning in diverse environments.

Despite potential challenges in implementing this approach, such as the need for teacher training and curriculum development, the potential benefits far outweigh these difficulties. Investing in understanding and applying brain-based learning in teaching Arabic to native speakers represents a crucial step toward developing more effective language education, enriching the educational process, and preparing a generation of learners capable of communicating fluently and thinking critically and creatively in their native language. The future requires further research and development to adapt these principles more effectively to different cultural and educational contexts and to ensure that they are utilised to their fullest potential.

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