

Brain-based learning strategies respecting pupil's emotions in language learning

ISSN 2657-9774; <https://doi.org/10.36534/erlj.2023.02.02>

Jana Trníková

Faculty of Education, Constantine the Philosopher University in Nitra, Slovakia

email: jtrnikova@ukf.sk

Abstract

The process of learning is about making connections. This paper presents brain-based learning as a starting point for teachers, which connects academic (content), and emotional level based on the brain research results. As we live in a stressful world, school classrooms can provide pleasure, emotional comfort, as well as knowledge. When teachers create a positive emotional environment pupils gain emotional resilience and learn more efficiently. The purpose of this paper is to focus on emotions through learning principles and emotionally "safe" school environmental factors which are inseparable part of teaching and learning process. This paper also presents strategies implementing theoretical knowledge into language learning and respecting students' emotions. It can be concluded that emotions play an important role in how and why students learn. Brain-based learning is one of the innovative ways or attitudes to learning a language, but also learning itself. By respecting stated starting points, we can not only make our teaching different, but especially enjoy learning, be satisfied with our performance and experience positive emotions that support the students' development.

Keywords: brain-based learning, brain, emotions, positive environment

Introduction

The human brain is the control center organizing our biological functions, thoughts, memory, motor skills, emotions, and behavior. It is not only a matter for researchers, doctors, psychologists, etc. but it is also necessary for educators. The brain is divided into lobes. Each lobe has many functions, and it is interconnected with other lobes through nerve circuits or pathways. Teachers need basic knowledge and understanding of how the human brain works because it is closely connected with understanding student's behavior as well as student's learning-related activity (in educational process). Technology like MRI (Magnetic Resonance Imaging), fMRI (Functional MRI), and PET (Positron-Emission Tomography) brought us imaging tools for brain visualization and analyzing brain functions.

All learning relates to the brain. Hence, neuroscience and classroom instruction are closely connected. Research results in educational sciences respecting brain and learning foundations show that we can obtain better results, become more effective in the way we teach or perform activities by respecting students' individual prerequisites.

Neuroeducation is according to D. Connel (2023) an emerging interdisciplinary field of study that attempts to apply findings in brain research to education. As he further states, the primary goal of this area is to enhance educational practices, improve student outcomes, and develop advanced understanding of how the brain affects learning. All the mentioned above means that it is a combination of several disciplines, including neuroscience, psychology, and education.

Brain-based pedagogical approaches are called by different names, such as "mind, brain and education" (Fischer et al. 2007, Schwartz & Gerlach 2011) and "educational neuroscience" (Campbell

2011, Geake 2009). T. Tokuhamma-Espinosa (2011) focuses on mind, brain education science interrelation and its possible implications in guide to brain-based learning. Educational neurosciences focus on how our understanding of the human brain can affect the curricular, instructional and assessment decisions that teachers make every day. According to A. Sousa (2014) also provides educators with an opportunity to reflect on research that can have an impact on their educational practices.

Neuroscience and education reveal how individual brains change when learning occurs. Neuroeducation is a 'bridge' between neuroscience and educational practice.

Theoretical background of the brain-based learning

Brain-based learning appeared as a new field in the 1980s and it is based on brain functions and information on how it might influence overall education process (2008, p. 3). Brain-based learning refers to teaching methods, lesson designs, and school programs that are based on the latest scientific research about how the brain learns, including such factors as cognitive development (how students learn differently by respecting factors as: age, grow, and mature socially, emotionally, and cognitively (Glossary of Education Reform).

According to E. Jensen (2008: 4), brain-based education is best understood by the letters E.S.P. meaning "engagement, strategies, and principles." This expresses the active engagement and implementation of purposeful strategies, which are based on principles obtained from a brain understanding (neuroscience). Brain-based learning is also defined as a multidisciplinary approach (including neurology, neurobiology, psychology, sociology, genetics, and biology) based on one simple question in our mind "What is good for the brain?". As E. Jensen (2008: 4) further says, brain-based learning (BBL) is the attitude and way of thinking about learning and teaching, as well as about teacher's work. It is not a recipe to follow, but it is a type of learning focusing on the brain in our mind.

It was previously mentioned that the teachers should understand how the brain learns new context. As E. Jensen (2008, p. 11) states that different type of learning take unique pathways in the brain and input is processed differently. Learning new context starts with input, which enters through the senses, or the input begins by thinking or memory. Initial processing of information starts in the thalamus. Simultaneously, the information is directed to the appropriate cortical structures (e.g., occipital lobe, temporal lobe) for further processing and immediately to subcortical areas (e.g., the amygdala). If the brain gets an emergency stimulus, the amygdala responds immediately and subsequently mobilizes other brain areas. Afterwards, the information is sent to the hippocampus for more accurate evaluation and additional held. The hippocampus organizes, distributes, and connects the created memories with the appropriate areas of the cortex for long-term storage (Jensen 2008: 10-11).

Learning causes growth of the brain cells (Willis 2006: 1). According to Jensen (2009: 5) new learning forms new synaptic connections. A neuron is a basic nervous system structural and processing unit. Information is stored in neurons and most of them are present in birth. Support and connecting cells enrich communication between neurons and they grow for a lifetime. These cells are called dendrites and sprout from the arms called axons or the neuron's cell body. Dendrites as a response to experiences, information, and learned skills increase in size and number as well (Willis 2006: 1). As further J. Willis (2006: 3) states "The more ways something is learned, the more memory pathways are built." Teachers need to be familiar with brain research discoveries because they need to understand what they should do for their students' brain. This leads to the conclusion that it is essential for teachers to stimulate the growth of more dendrites and thus create more synaptic connections.

It is very important to introduce and to review the learned material to the brain by many ways (using various methods and senses) because in that way more dendritic pathways will be created. This is valuable information for classroom teachers. It means that there will be more synaptic connections and they will be used more often, thus becoming stronger and remaining longer. For example, if we offer the information visually (connection with occipital lobes), and students subsequently hear it (temporal

lobes; important role in regulation of emotions and memory processing), this process will result in an opportunity to access the stored information (Willis 2006: 4).

The choice of teaching methods in the educational process should be sensitive to all changes concerning the student's life. At a younger learner age, the brain development is more generalised. The neural connections become well established in most areas when the student reaches adolescence. This means that primary teachers should focus on a more general, holistic approach to education helping to establish overall brain structure (Bartlett & Burton 2016: 272). They should also remember that a student's attention span is shorter than in adult age, while decision-making is more difficult and working memory is less efficient.

Research on brain functioning has also impacted education of students with specific learning disorders such as dyslexia, reading disorder, etc.

The sources for learning new topic, facts, vocabulary, etc. are endless. They may include lectures, discussions, explanations, visual materials and tools, environmental stimuli, experiences, role models, reading, videos, projects, etc. There is no one and single best way for students to learn something (Jensen 2009: 6).

Caine et al. developed the following 12 brain/mind learning principles (Caine et al. 2009: 21-254) generated in fields from psychology to biology and neuroscience:

1. *"All learning is physiological."* This means that brain changes because of our experiences. Learning engages body and brain as a whole organism. Sensory engagement, physical movement, verbal articulation and action are necessary to develop new skill or competence. Any skill changes the brain. Students need to be involved in experiences using their senses, movement, activity, and decision-making as well as problem solving (Caine et al. 2009: 146-162).
2. *"The brain/mind is social."* According to Caine et al. (2009: 56-73) we cannot ignore the impact of relationships and community on learning in and outside the school. We relate to others and how the others relate to us are influenced and affected by our language, state of mind, attitudes, and approach to higher-order learning. Teachers need to engage students' social nature and requirement for relationships.
3. *"The search for meaning is innate."* This means that the search for meaning organizes questions and encourages the use of executive functions and it is enhanced by relaxed alertness. Learning can become more effective when students' interests and ideas are engaged (Caine et al. 2009: 74-91).
4. *"The search for meaning occurs through patterning."* Patterning relates to the purposeful organization and arrangement of the information. The patterns that a person perceived, and the choices of focus are the basis for decision making. New patterns should be linked to already comprehend information, matter, or content (Caine et al. 2009: 163-176).
5. *"Emotions are critical to patterning."* Emotions are part of every thought, decision, and response. Teachers can facilitate relaxed alertness and accept the relationship between the roles or emotions and learning. Students need to experience appropriate emotions obtained by various experiences (Caine et al. 2009: 92-108).
6. *"The brain/mind processes parts and wholes simultaneously."* The brain/mind is designed to make sense of the world, which contains an infinite amount of information. According to Caine et al. (2009: 129-145) the teaching process needs to start with an experience that provides students exposure to the subject matter. All students can learn more effectively when they connect an experience from whole to the details (facts and information).
7. *"Learning involves both focused attention and peripheral perception."* Attention is an inherently natural phenomenon laid by meaning, novelty, interests and emotions. Attention is also critical to memory. According to Caine et al. (2009: 216-229) teacher's work is needed to engage students in exercises of executive functions necessary to attend and to make decisions. They

should understand how to teach context and how to use it to support explicit learning. Effective learning happens when students' attention is deepened, and multiple layers of context are used to support learning.

8. *"Learning always involves conscious and unconscious processes."* Learning involves layers of consciousness. Successful learners can monitor themselves, so they know their own strengths and weaknesses, and take responsibility of the process and of the result of learning. Students need the time to reflect and to accept their own learning. (Caine et al. 2009: 230-242).
9. *"There are at least two approaches to memory. Archiving isolated facts and skills or making sense of experience."* According to Caine et al. (2009: 203-215) memory makes possible any type of performance. Teachers need to understand rote memorization (represents traditional approaches to teaching), and dynamic memory (engages in everyday experiences). This means that teachers should teach students through experiences that involve multiple approaches to remembering.
10. *"Learning is developmental."* According to Caine et al. (2009: 177-191) all learning is built on previous learning experiences encouraged by changes in the physiology as interaction with experiences. It is not the age or grade level, but performance that provides the best proof for further and following learning. It means that teachers need to take into consideration individual differences in maturation and development.
11. *"Complex learning is enhanced by challenge and inhibited by threat associated with helplessness."* The best mental state for higher-order functioning is relaxed alertness which requires healthy relationships. Relaxed alertness must be a primary goal for teachers. Their task is also to create a supportive, tolerant, demanding, and challenging environment (Caine et al. 2009: 36-55).
12. *"Each brain is uniquely organized."* Humans are both similar and different at the same time. Teacher needs to engage the uniqueness, individual talents, abilities, and capacities of the students in the teaching process (Caine et al. 2009: 241-254).

The above-mentioned principles were based on a view of human beings. As the authors states no principle is more important than another. The principles help teachers understand what it means to learn and teach. They are inspirational and point out on several processes involved, e.g. emotional, cognitive, behavioural, etc. It can be concluded that integration of different aspects of learning is the key to effective education.

Emotions and learning

Students' emotions are very important for learning to take place. The goal of education is to support learning or as E. Jensen (2005: 5) says to promote learning, however sometimes there are factors, which inhibit this process. One of the mentioned factors is stress. The reason is because stress is experienced as a threat. E. Jensen (1998) says that the threat impairs brain cells, namely "Threat also changes body chemistry and impacts learning." Stress chemicals affect hippocampus (the brain part which filters and helps store long-term factual memories) (Jensen 2008: 44).

Our brain is very sensitive to emotional states. Neuroscientists usually separate emotions and feelings. Emotions are seen as a result of biologically automated pathways (Jensen 2008: 84). We distinguish between six universal emotions: joy, surprise, disgust, fear, sadness, and anger. Culturally and environmentally advanced responses to factors and conditions are called feelings (e.g. worry, anticipation, frustration, cynicism, and optimism). Emotions and feelings move along separate biological pathways in the brain (Jensen 2008: 84). Emotions impact student behaviour by creating a distinct state. A state is a moment composed of specific posture, breathing rate, and chemical balance in the body (Tyng et al. 2017).

The amygdala and hippocampus are the brain parts, which encode and play an important role in emotions or emotional meaning of incoming input. Input with positive emotional connection is kept successfully. So, the best instructions during lessons and the learning process relate to interesting surprise and positive emotions like pleasure (social pleasure of work with peers or group), novelty, fun (physical movement), art, music, and various stimulation etc. (Jensen 2008: 85-86). The research results focused on neuroimaging showed that students experiencing positive emotional states are better focused, enhance their memory, increase decision making, problem solving, flexible thinking, and stimulate their creativity (Tyng et al. 2017). It has also an impact on their social skills such as patience, helpfulness, sociability, etc. it can be concluded that teachers should stimulate the level of stress in the classroom, so that it is at an appropriate level and so that it supports positive brain reactions by eliminating stressors.

Children’s feelings are affected by their language, communication, environment, as well as by the quality of relationships. Language is very important and necessary for every human being. It is also the key, which enables us to develop our potential, to obtain knowledge, to interpret our ideas, and it is a tool for learning and reaching our goals. Although language is acquired “naturally” from the brain’s point of view it is a difficult task. At least six areas need to be coordinated whenever we say a word or interpret text. It is a complex function at school and in life as well. For language development it is important to talk with the child, to spread vocabulary and sentences, to correct him/her without pointing out mistakes and to spend time on reading.

Students must feel emotionally safe as well as physically safe in the classroom. If the teacher respects this, learning can happen. A supportive, creative, and encouraging environment is the best way for students to learn. It is necessary for teachers to keep this fact in mind and respect it during their preparation and the teaching process. According to J. D. Connell (2005: 30-31), teachers and students can enhance the school environment to ensure optimal brain development and growth. Table 1 present contributing school environment factors.

Table 1: Brain-based school environmental factors (Connell 2005: 33).

Environmental factor	Reasons and descriptions
1. Safe classroom environment	Students need to feel safe to learn. This happens when teachers enforce agreed and respected rules by all students (irrespective of multicultural or learning differences). This all means that before a student’s part of the brain called neocortex will take in and learn new information, their limbic system must inform the neocortex that it is “safe” to learn.
2. Stimulating/challenging classroom environment	Changing the classroom environment during the school day (e.g. whole group, small group, one-on-one) is necessary because it will stimulate different parts of the brain.
3. Varied teaching methods	Different types of students’ learning styles require using different methods during the lesson or a day at school (this means implementing as many multiple intelligences as possible and using multisensory approaches). Implementation of different intelligences and activities stimulate different parts in the brain so new neural connections can be created.
4. Teacher’s tone of voice	Students process spoken, but unspoken messages as well. Expressing authentic stimulation and showing the teacher’s

	excitement create miracles on students’ limbic system. Limbic system gives the neocortex information that it is “time to learn”.
5. Teacher’s hand, facial, and other gestures	Gestures and nonverbal communication create more than 50 percent of communication and play a very important role in the teaching and learning process. The limbic system explains the message to conclude if the learning process is safe and can become and if the information and the content is relevant to learn or not.
6. Encouraging students to drink water	The human brain needs water (three to five glasses per day) to function properly. Headache because of dehydration decreases the learning potential. The brain needs water for production of protective cerebrospinal fluid.
7. Providing movement throughout the day	Movement and exercise enhance the blood supply and oxygen to the brain.
8. Nonfluorescent lighting	Cortisol levels in the blood can be raised by fluorescent light. Cortisol is the hormone that relates to negative emotions and released particularly when we are stressed.
9. Reduced stress	The brain is affected negatively by constant stress. It can be caused by many different situations, which are unpleasant. Teachers should create stress-free classroom as much as possible.
10. Time for reflection throughout the day	The brain needs time. Reflection time is necessary for searching, developing and creating stronger neural connections.

If we respect a student – learner, we support his/her individuality, learning and process of remembering. For supporting all the factors mentioned above we need to be respectful and plan teaching process precisely using various teaching and learning methods. Part of the success lies in the teacher himself, who, with his calm and natural tone of voice, creativity, way of communication, agreed rules, contributes to the support of the student and an environment that reduces possible stress. Physiological factors such as light, water, activity, and exercise are also required.

According to Tyng et al. (2017) and their research study entitled *The Influences of Emotion on Learning and Memory* it is necessary to integrate emotions into the process of learning.

A brain-based environment supports the expression of emotions in the following approaches such as creating brain-based learning climate, significance and cognition of feelings and emotions, providing more individually meaningful projects and individual preference, using productive rituals, ensuring that success is accessible to every learner, creating helpful learners group using peer review and feedback, self-assessment tools, assigning learning projects to learn and work with others approaches (Jensen 2009). I agree with this statement, which supports individuality, and also bring interesting ideas for its implementation.

Emotions have a specific role in learning. They help us to determine what is real, what we feel, and help us to make better decisions by engaging the values. Emotions affect and activate long-term memory on a chemical basis.

Language learning

Children living in a reasonably stimulating environment acquire their mother tongue fluently, naturally, and without targeted teaching. However, this process requires some effort and attention. Communication is present from birth, and in the first years of a child's life, language and speech develop rapidly.

Second language acquisition (SLA) is an unconscious process in which an individual learns a language that is different from the mother tongue. It is necessary to distinguish whether it is the second (official) language in the country or a foreign language. Both can be illuminated in the natural environment, adapted conditions or in the school environment (Mačajová et al. 2017: 45). We can compare the processes that take place in the mother tongue and the foreign language through various applied theories. It is not unusual for a child to acquire the mother tongue without problems, but at school he/she has "troubles" with learning a foreign language.

Behaviorists see these processes as very similar because imitation and repetition are their common features. Nativists were convinced that learning both languages require previous experience to structure the new experience. The child takes over the language he/she hears and uses it selectively based on what he knows. Cognitivists believe that there are significant differences between these processes. According to them, the learner of a foreign language is more intellectually developed. There are many prominent linguists who have devoted themselves in detail to theories of foreign language acquisition, e.g. S. Krashen with a nativist view through the input hypothesis model, McLaughlin - cognitive model of attention processing, implicit and explicit model by E. Bialystok, R. Ellis. N. Ellis and M. Long with the interaction hypothesis model. All the mentioned models emphasize different aspects of language acquisition and are based on different psychological directions, while it is important not only to know them, but also to perceive other factors that influence this process and its quality.

S. Krashen developed a theory of language acquisition and development including the hypothesis of the affective filter (Schütz 2019). He described the higher success rate of second language acquisition in learners with low stress and slower language acquisition for learners with high stress. He postulated that anxiety and low self-image created a mental block that filtered or blocked out new learning. The manifestation of the affective filter was demonstrated on fMRI scans of the amygdala ten years later. A state of anxiety occurs when students feel alienated from their academic experiences or anxious about their lack of understanding. Teachers recognize that this stressed state happens when a lesson is tedious, confusing, e.g. students do not know the meaning of the vocabulary words in a story, etc. In this situation information does not pass through the amygdala to the higher thinking and memory centers of the brain.

According to C. Hannaford (2005: 104) very important to speech is hand action, because hand area is the primary area for speaking. Talking while using hand gestures is essential to language development and to thinking. Hand gesturing appears to tap into different parts of the brain (Goldin-Meadow et al. 2001) dealing with visual and spatial subject matter, making demands on other memory stores that allows the speaker to free up cognitive resources and remember more.

Neuroscience is another important source of information in today's modern society and the field of education. Research on brain functions shows that the maturity and lateralization of the brain according to S. Grofčíková (In Mačajová et al. 2017: 53) also affect success in acquiring a foreign language. Success lies in the approximation of pronunciation to a native speaker, the fluency of speech production and the approximation of the grammar of a native speaker. It is therefore about the creation of functional competences. The relationship between laterality and the acquisition of a foreign language was pointed out, for example, by T. Scovel (1969), while it is necessary to distinguish between the onset of lateralization (around the 5th year of life) and the completion of lateralization (around puberty).

Our attention is focused on understanding the multiplicity of the brain processes affecting language acquisition. The description of the functions, which each hemisphere is responsible for, has been

developed by many authors. Language belongs to the left hemisphere in the brain. The right hemisphere process emotional components of the language. Grammar, syntax, vocabulary, and pronunciation are processed by different areas and many of them must work together to process language.

The brain starts process of language in the thalamus, which diverts sensory input to appropriate areas for processing. The brain must recognize incoming data as sound and send it to the auditory cortex. The auditory cortex differentiates the sounds as environmental or language. If it is identified as language it is send to language areas for further processing in the brain including Broca's area (speech and language production) and Wernicke's area (speech and language comprehension). If it is going to be spoken or sounded out silently, the motor area should be activated as well (Zadina 2014). Learning the first, as well as second language creates a neural network. These networks can overlap in the brain.

Purpose and subject of research

The aim of my study was to implement brain-based learning principles mentioned above through brain-based teaching model in language classes and to focus on the emotional aspects in education. The implementation was focused on exercises, activities, and practical tasks into the lessons of the Slovak language and English. During the creation of brain-based teaching model we followed brain-based teaching principles that were specified in more details in the theoretical part of the paper. The goals of our teaching model were to prepare a collection of appropriate exercises for relaxation and comfort, to suggest and include the individual exercises and activities into an appropriate part of the lesson, to be properly prepared for teaching, to respect the curriculum, to respect and ensure the conditions for brain-based teaching, to prepare didactical materials and teaching aids necessary for the application and realization of the created model.

A research sample was composed of fourth-grade pupils at the first grade of primary school (in the Slovak school system, fourth-grade pupils are 10 – 11 years old children).

As main research method it was used pupil's diary. Diaries are a qualitative diagnostic method and a source of very interesting information about school processes and about individuality in the educational process. The events from a school and a class environment that are important or interesting for the pupil for some reasons according to the personal viewpoint are recorded in the natural time sequence. Thus, pupils' diaries are an instrument important for reviewing the created model respecting the brain-based teaching and learning.

Pupils' diaries were used as a way of an immediate record of the feelings and impressions from the lesson of a particular day. When we were distributing the diaries, we informed the pupils about the goal and way of writing to the diaries and their functions. Simultaneously, we reminded the pupils that the answers must be true, that they need not be afraid of anything, and that their answers will not be recorded under their names and will be used solely for our research. The introductory data about a pupil who was writing to their diary consisted of a text with their name, classroom, and school. The space under the data was dedicated to creating a self-portrait of the pupil instead of a photo that was used for supporting the pupil's creativity.

The pupils conclude that school is a safe and favourite place, but not for all of them and not for the same reason. The apprehensions and fear from the school attendance is, according to their responds, connected with written exams, tests, exercises, and other tasks that represent a threat for them because they are coming "hand in hand" with bad marks. They positively react to the brain-based teaching model, chosen methods, activities, brain workout, and exercises focused on improvement of their brain activity. A qualitative analysis of the pupils' diaries provides an irreplaceable source of information originally created by the participants.

We came into conclusion that if the teacher respects students' feelings it can be valuable for both sides – teacher as well as student. Diary can be simple way to encourage students to reflect on their

feelings during the day at school. If the teachers accept every learner and his/her individuality, they can expect a more positive outcome, and an effective teaching and learning process.

Brain-based learning strategies

We conclude that the teachers can implement several strategies to enhance brain-based learning and to develop students' potential and positive emotions in language learning. We derived them from our experience and the many materials we studied for the preparation of the study. We focused on students' individuality and develop positive attitude to the learning process:

- Provide opportunities for success;
- Encourage students;
- Support students in developing their own goals for learning;
- Support a sense of belonging;
- Establish new, positive rituals (positive greeting, etc.);
- Encourage participation rituals (applause, etc.), closing rituals (song, self-assessment, gesture, etc.), personal rituals to celebrate individual achievement;
- Use positive teacher tone;
- Apply visual elements to recall and absorb information by seeing;
- Break learning into chunks (understand and comprehend);
- Get moving to increase brain activity;
- Make/Create "success" list.
- Incorporate assignments that require discussion, reflection tasks, surveys, etc.

Given strategies are focused on engagement of the students, which is essential because it is the basis for successful learning and a lesson. They all are connected to motivation necessary to keep during the lesson as well as all throughout the school day. Activating prior knowledge, acquiring, and processing of new knowledge, as well as learning evaluation, are the further essential parts of language lesson design and organization.

Conclusion

Neuroscience and education link up to achieve the best possible practice based on the research findings. The implications for education from neuroscience research on learning language are immense. Learning more than one language improves the brain in many ways and contributes to school achievement. Research results point to invisible processes such as attention, memory, etc. and prove that language learning improves critical skills.

Our brain is changing every day by our everyday activities, experiences, and learning. Each student is unique and different from the others in many aspects as well as in the learning process. Hence, it is important to use different brain-based learning strategies in teaching and learning practice to incorporate a wide variety of learners and their needs. The reason is also to improve students' performance and to increase their chances of success.

Emotions have a specific role in language learning. They can help students if they are positive, but they can also inhibit the learning process in a negative way. The teachers should create an environment, which is supportive, positive, creative, etc. Students should feel acceptable, welcome, and somehow exceptional.

Incorporating brain-based learning and finding innovative strategies helps students to learn and helps teachers to teach effectively. Teachers need to understand the basis of brain functioning for better learning results. This is the way to innovate our education practices and to focus on our students.

References

- Bartlett, S., Burton, D. (2016). *Introduction to Education Studies*. London, Sage.
- Caine, R. N., Caine, G., McClintic, C., Klimek, K. J. (2009). *12 Brain/Mind Learning Principles in Action. Developing Executive Functions of the Human Brain*. California, Corwin Press.
- Campbell, S. R. (2011). *Educational neuroscience: Motivations, methodology, and implications*. *Educational Philosophy and Theory*, 43(1): 7-16.
- Connell, D. (2023). *Neuroeducation: Definition and Examples*. <https://helpfulprofessor.com/neuroeducation/> Accessed on 20th September 2023.
- Connell, J. D. (2005). *Brain-Based Strategies to Reach Every Learner*. New York, Scholastic.
- Fischer, K. W., Daniel, D. B., Immordino-Yang, M. H., Stern, E., Battro, A., & Koizumi, H. (2007). *Why Mind, Brain, and Education? Why now? Mind, Brain, and Education*. https://www.researchgate.net/publication/265258093_Defining_the_Boundaries_for_Neuroeducation_as_a_Field_of_Study. Accessed on 20th September 2023.
- Geake, J. G. (2009). *The brain at school: Educational neuroscience in the classroom*. Maidenhead, England: McGraw-Hill; Open University Press.
- Glossary of Education Reform by Great School Partnership. <https://www.edglossary.org/brain-based-learning/>. Accessed on 13th April 2023.
- Goldin-Meadow S, Nusbaum H, Kelly S, Wagner S. (2001). *Explaining math: Gesturing lightens the load*. *Psychological Science*. 2001; 12:516–522.
- Hannaford, C. (2005). *Smart Moves. Why Learning is Not All in Your Head*. Salt Lake City, Great River Books.
- Jensen, E. (1998). *Teaching with the brain in mind*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Jensen, E. (2005). *Teaching with the Brain in Mind*. Alexandria, Association for Supervision and Curriculum Development.
- Jensen, E. (2008). *Brain-Based Learning. The New Paradigm of Teaching*. Thousand Oaks, Corwin Press.
- Jensen, E. (2009). *Super Teaching*. Thousand Oaks, Corwin Press.
- Máčajová, M., Grofčíková, S., Zajacová, Z. (2017). *Fonologické Uvedomovanie ako Prekurzor Vývinu Gramotnosti*. Nitra, Univerzita Konštantína Filozofa v Nitre, Pedagogická fakulta.
- Scovel, T. (1969). *Foreign Accents, Language Acquisition and Cerebral Dominance*. *Language Learning*, 19: 245-254.
- Sousa, D. A. (2014). *Brainy Teaching: Educational Neuroscience and Classroom Practice*. https://www.teachermagazine.com/au_en/articles/brainy-teaching-educational-neuroscience-and-classroom-practice . Accessed on 15th September 2023.
- Schütz, R. E. (2019). *Stephen Krashen's Theory of Second Language Acquisition*. <https://www.sk.com.br/sk-krash-english.html> . Accessed on 15th March 2023.
- Schwartz, M., & Gerlach, J. (2011). *The birth of a field and the rebirth of the laboratory school*. *Educational Philosophy and Theory*, 43(1): 67-74.
- Tokuhama-Espinosa, T. (2011). *Mind, Brain, and Education Science. A Comprehensive Guide to the New Brain-Based Teaching*. New York: W.W. Norton & Company.
- Tyng, Ch. M., Amin, U. H., Saad, M. N. M., Malik, A. S., (2017). *The Influences of Emotion on Learning and Memory*. *Frontiers in Psychology, Section Emotion Science*, 8. doi.org/10.3389/fpsyg.2017.01454
- Willis, J. (2006). *Research-Based Strategies to Ignite Student Learning*. Alexandria, Association for Supervision and Curriculum Development.
- Zadina, J. N. (2014). *Multiple Pathways to the Student Brain. Energizing and Enhancing Instruction*. San Francisco, Jossey-Bass.