

# EARLY CHILDHOOD NEUROPEDAGOGY: AN OPENING WINDOW TO THE WORLD

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“Brains are built not born” (Dr. Jack Shonkoff, Harvard University)

## **Abstract**

An Early Childhood Neuropedagogy International Research Group & Lab (NeuPedLab©) was established by Laszlo Varga, at the Benedek Elek Faculty of Pedagogy in Sopron, Hungary (Varga - Szécsi, 2018). The latest research emphasises childhood as a key factor. In recent years, research on young children’s early brain and emotional development has underscored its importance for later development. Integrating this “Brain-Based, Heart-Felt” research into classroom practice, however, requires a meaningful dialogue between educators and brain scientists that is to inform both research and ECE institutions. Linking brain and EQ research to ECE is extremely valuable to our understanding of child development and learning. This ongoing work promises to provide educational sciences with substantial new data, while also enriching and reshaping the training of nursery school and early childhood educators, as well as the innovation of early childhood education and research facilities (Szécsi – Varga – Mák, 2018). The human brain is a mysterious organ that poses serious learning challenges to scientists and child educators. Understanding how neuroscience can inform education strategies and finding out what teachers want and need to know about the ways children learn are two key drivers behind the neuro-education initiative. At birth, the brain is remarkably unfinished. The period up to approximately eight years of age represents the peak stage of brain development. From birth to about the age of eight the brain is a *super-sponge*—this is the brain’s most absorbent stage, where it actively learns from its environment. “Windows of opportunity” are sensitive periods in children’s lives when specific types of learning take place. Information flows easily into the brain through “windows” that are open for only a short duration. Then the “windows” close, and much of the fundamental architecture of the brain is completed and probably not going to change very much more. This raises a central question: *What should we give, and what should we withhold, from children during these first crucial years?* Children who

have little opportunity to explore and experiment with their environment may fail to develop fully the neural connections and pathways that facilitate later learning. Further, exposure to trauma or chronic stress can make children more prone to emotional disturbances and less able to learn. Scientists are continually learning more about how young children's brains develop. At the same time, teachers are looking for effective strategies to help children use their brains to their fullest capacity (Mák – Szécsi – Varga, 2018). This review also contributes to this dialogue by summarising what we already know about the learning process in the brain, and suggests how it might inform the teaching and learning process in the classroom. Intelligent investment in early childhood is key to fostering a happy life—a reminder of the immense opportunity and responsibility on our shoulders, since early years last forever.

**KEYWORDS:** *early childhood, brain development, brain-based and heart-felt education, constructivism, neuropedagogy, windows of opportunity*

## Neuropedagogy in Hungary

The International Research Team and Laboratory of Neuropedagogy (NeuPed-Lab) is a unique scientific institute at the Benedek Elek Faculty of Pedagogy, Sopron University in Hungary. Based on the Hungarian and international interdisciplinary scientific research in early childhood education, the institute aims to explore the avenues for applying the current findings of neuroscience, primarily in terms of their applicability in the field of pedagogy. Members of this research team—paediatric neurologists, researchers of educational sciences, psychologists and classroom teachers—collaborate on studies in order to develop new pedagogical theories and educational innovations that are built on current knowledge in neurology, neuroscience, and pedagogy (Varga – Szécsi, 2018).

## What we know and how children learn

In recent years, many researchers are focusing on early childhood development and its importance. It is a proven fact that brain development accelerates between ages two and five. It is the educator's responsibility to support this critical growth and learning period. Providing intentional instruction through brain-based learning enhances children's social, emotional, and cognitive learning.

Brain-based learning uses the latest scientific research on how the brain learns and how it informs lesson designs and/or teaching methods. The latest findings show that stress and emotions are highly affecting children's learning. Cognitive science re-

search shows that, when the brain is engaged in the process of learning, it changes physically. In addition, practicing certain skills makes learning easier (Gregory, n.d.). Brain-based learning is important, and here are a few reasons why: it improves retention and academic performance, increases brain capacity, promotes social and emotional skills, creates a positive and safe environment, incorporates active learning activities, etc.

Recent research indicates a strong link between brain development and emotional intelligence (EQ), and these studies are extremely valuable to Early Childhood Education. Emotional intelligence (otherwise known as emotional quotient) is the ability to understand, use and manage one's own emotions in a positive way to relieve stress, communicate effectively, empathise with others, overcome challenges, and defuse conflicts. Childhood as the age of experience and heuristic learning offers a way of learning and problem solving that allows individuals to discover things for themselves, and learn from their own experiences. Children should be taught the way they learn, based on their individual experiences, and not as we believe they should be taught.

## **Constructivism**

The concept of neuropedagogy is built on the theory of constructivism. Jean Piaget, the Swiss psychologist and the founding theorist of constructivism, pointed out that knowledge which is a result of the child's reaction to the environment, is constructed through interaction with real objects in authentic situations. Overall, Piaget (1970) determined knowledge as the result of the brain activity in which the child constructs an understanding through interactions with their environment. Piaget suggests that knowledge is the outcome of the constructive function of the brain.

Constructivism, a new paradigm of learning theories which emerged in the 20th century, focused on the child's inner world rather than on the process of learning. In Hungary, Nahalka István (2002) served as a key figure in research and application of constructivism in pedagogy. According to the constructivist learning theory, the child is unable to receive the knowledge as a passive participant; instead, the child is seen as an active participant in the construction of the new knowledge (McDevitt and Ormond, 2016). Therefore, the role of a child as an active learner generated a symbol of "self-made man". In addition, the child's brain, which plays an important role, is responsible for interpreting, and constructing new information. This way, the child actively builds new information on their prior background knowledge, expanding "the mental map" of the surrounding world in their brain. Furthermore, the learning

process is driven and lead by the child who is constructing the new knowledge (self-made child); at the same time, the teacher or caregiver takes a supporting role. The knowledge is not delivered by teachers, adults or caregivers; the process of learning is rather facilitated by the teacher in an optimal environment to promote children's construction of new structures and concepts. This theory of learning emphasises the role of teachers in exploring the child's prior or background knowledge, and in creating a supportive learning environment (Bredekamp and Copple, 2015). The four stages of Piaget's model are the following: sensorimotor stage (0-2 years old), preoperational stage (2-7 years old), concrete operational stage (7-11 years old), and formal operational stage (11 years old through adulthood). Current data brings awareness with respect to the critical importance of children's earliest experiences. The first 7-8 years of a child's life are crucial for a well-rounded early childhood foundation. These are the years when we can see more than 75% of brain growth. According to Jack Shonkoff from Harvard University, the first 8 years of children's life is the most rapid period of development, and offers a foundation for all future learning. Child development is a dynamic and interactive process, in which children need good health, strong families and high-quality early learning and experiences.

## **Neuroscience and early childhood education**

The brain is an adaptable, learning organ. Early adverse experiences can influence brain system development, and our brain can adapt to negative or positive experiences. Exploration, play, and trusting relationships can create opportunities for the brain to keep learning. Neuroscience research has provided valuable insights into how children learn and remember information. Neuropedagogy covers two major areas: the effects of neurology on the practice of education, and the knowledge of teachers on the nature of learning. Understanding how neuroscience can inform education strategies, and finding out what teachers want and need when it comes to their understanding of the ways children learn, are two key drivers behind the neuro-education initiative. At birth, the brain is remarkably unfinished. The period up to eight years is considered to be the peak time for brain development. From birth to about the age of eight, the brain is a super-sponge. This is the brain's most absorbent stage, where it actively learns from its environment. "Windows of opportunity" are sensitive periods in children's lives, when specific types of learning take place. Information flows easily into the brain through "windows" that are open for only a short duration. Then the "windows" close, and much of the fundamental architecture of the brain is completed and will probably not change very much more. It is a central question what to give and what

not to give to our children in their first years. Children who have little opportunity to explore and experiment with their environment may fail to develop fully the neural connections and pathways that facilitate later learning. Further, exposure to trauma or chronic stress can make children more prone to emotional disturbances and less able to learn. Scientists are continually learning more about how young children's brains develop while, at the same time, teachers are looking for effective strategies that would help children use their brains to their fullest capacity. There are three secrets that everyone must know: children need love, stable and safe relationships, and a stimulating environment. None of these needs is a financial matter, but instead a question of time, which becomes the most valuable investment one can offer.

## **Six major intelligences**

The concept of intelligence is defined as the ability to learn from experience, solve problems, and use our knowledge to adapt to new situations. The six major intelligences are: Intelligence Quotient (IQ), Emotional Quotient (EQ), Social Quotient (SQ), Moral Quotient (MQ), Operations Quotient (OQ), and Digital Quotient (DQ) (Onsovskaya, 2018). The first two intelligences, cognitive and emotional intelligence, is what early childhood is focusing on, and they are both key factors in children's brain development. Carol Dweck's research on mindsets and how a growth mindset allows us to obtain greater success than a fixed mindset does, aligns with our focus on IQ and EQ. She believes that the fixed mindset (which is the traditional way of education) is where failure represents the limit of one's abilities, and the growth mindset (which is the constructivism in pedagogy) is where failure represents an opportunity to grow.

## **Success**

In their first few years of life, young children acquire social and emotional skills. These skills lay the foundation for developing cognitive abilities that are critical for success in both school and life. The attribute of early experiences can lay either a strong or a weak foundation, and early childhood is therefore a critical window for every child's life. The quality of experiences and the relationships during this time can have life-long implications.

Social and emotional development is children's emerging ability to experience, regulate and express a range of emotions, to develop close, satisfying relationships with other children and adults, and actively explore their environment and learn.

Nowadays, the central question is what to give and what to withhold to our children in their first years. Intelligent investment is thus crucial in establishing a happy life, and there seems to be an immense opportunity and responsibility on our shoulders, for it is now clear that the early years experiences last forever. In conclusion, early childhood education is the wisest investment.

## Conclusion

There are three key points that we are focusing on. One is a scientific dialogue launched between teachers and neurologists, in an effort to apply neurology research data to educational context. The second is that we also facilitate and promote the dialogue between scholars and scientists to further our reach. The third is that scientists are working hard to form new educational views, and lastly, that early childhood development has never been more focused on human sciences.

It is our conclusion that loving and professional education is the key to achieving happiness and fulfilment in human life. It is time to reconsider the pedagogical landscape, especially in early childhood education. A new image of children, a new perspective on childhood, and a new educational pedagogical approach to young children are emerging. Although it has been claimed a number of times that there is nothing new “under the sun”, we need to rethink the framework and forms of education in the 21st century—because the world has changed. Recognising that our current approach might not be the right one, we should return to the ways we were raised by our parents, grandparents, or great-grandparents. Humanity is living through life-changing times, and education is also experiencing a change of era because of the spread of digitalisation. In a world without the boundaries of competence and control—which should come as the latest sounding alarm—contemporary pedagogical discourse is increasingly concerned with the phenomenon of the toxic childhood experience. Our message focuses on love. Love is a breeding ground for early childhood development. Everyone who is working in any field of early childhood education should contribute to the creation of a universally happy childhood.

To return to our initial question—*Is it necessary to change our pedagogical culture?*—our answer is clear: yes, absolutely.

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## **NEUROPEDAGOGIJA RANOG DJETINJSTVA: OTVORENI PROZOR PREMA SVIJETU**

„Moždane se strukture grade, a ne radaju“ (Dr. Jack Shonkoff, Sveučilište Harvard)

### **Sažetak**

Međunarodnu istraživačku skupinu i laboratorij za neuropedagogiju ranog djetinjstva (NeuPedLab©) osnovao je Laszlo Varga na Pedagoškom fakultetu Benedek Elek u Sopronu, Mađarska (Varga i Szécsi, 2018). Najnovija istraživanja naglašavaju važnost djetinjstva kao ključnog faktora. U posljednjih nekoliko godina istraživanja o ranom razvoju mozga i emocionalnom razvoju male djece naglasila su njegovu važnost za kasniji razvoj. Integracija navedenih, „mozgom vođenih i srcem osjetljivih“, istraživanja u praksi u učionici zahtijevat će znatan dijalog između odgojitelja i neuroznanstvenika kako bi se unaprijedila i istraživanja i institucije ranog djetinjstva. Povezivanje istraživanja mozga i emocionalne inteligencije s obrazovanjem ranog djetinjstva iznimno je vrijedno za naše razumijevanje razvoja i učenja djece. Ovaj pregled pružit će obrazovnim znanostima mnoštvo novih informacija i podataka, dok će istovremeno modificirati i dopuniti sadržaj obuke odgojitelja u vrtićima i edukatora ranog djetinjstva, kao i inovaciju obrazovnih i istraživačkih objekata ranog djetinjstva (Szécsi, Varga i Mák, 2018). Ljudski je mozak tajanstveni organ koji predstavlja ozbiljne izazove za učenje znanstvenicima i odgojiteljima. Razumijevanje kako neuroznanost može informirati obrazovne strategije i otkrivanje što učitelji žele i trebaju znati o načinima na koje djeca uče dva su ključna pokretača neuroobrazovne inicijative. Pri rođenju mozak je izvanredno nedovršen. Period do osam godina vrhunac je razvoja mozga. Od rođenja do otprilike osme godine mozak je superspužva. U tom smislu, ovo je najupijajuća faza mozga, u kojoj aktivno uči iz okoline. Tzv. „prozori prilike“ osjetljiva su razdoblja u životima djece kada se odvijaju specifične vrste učenja. Informacije lako ulaze u mozak kroz „prozore“ koji su otvoreni samo kratko vrijeme. Tada se „prozori“ zatvaraju pri čemu se dobar dio osnovne strukture mozga uobličio, nakon čega vjerojatno neće više doživjeti mnogo promjena. Ključno je pitanje što dati, a što ne dati djeci u njihovim prvim godinama. Djeca koja imaju malo prilika za istraživanje i eksperimentiranje sa svojom okolinom možda neće u potpunosti razviti neuronske veze i puteve koji omogućuju kasnije učenje. Nadalje, izloženost traumi ili kroničnom stresu može učiniti djecu sklonijom emocionalnim poremećajima i manje sposobnima za učenje. Znanstvenici neprestano uče više o tome kako se mozgovima male djece razvijaju. Istovremeno, učitelji traže učinkovite strategije kako bi pomogli djeci da se koriste svojim mozgovima do njihova punog kapaciteta (Mák, Szécsi & Varga, 2018). Ovaj pregled također doprinosi ovom dijalogu sažimajući ono što već znamo o procesu učenja u mozgu i sugerira kako bi to moglo informirati proces poučavanja i učenja u učionici. Inteligentno ulaganje jest vrsta ključa za uspostavljanje sretnog života, pa postoji neograničena prilika i golema odgovornost na našim ramenima, jer rane godine traju zauvijek.

**KLJUČNE RIJEČI:** *rano djetinjstvo, razvoj mozga, obrazovanje vođeno mozgom i srcem, konstruktivizam, neuropedagogija, prozori prilike*