Concept of inclusion on the section of Vygotskian socio-cultural theory and neuropsychology

Darja Kobal Grum

Inclusion

Concept of inclusion

Inclusion is a paradigm that has its roots in social justice and the deinstitutionalization and civil rights movements of the 60's. Over the last decade, the enrolment of children with special needs in regular classes has been one of the most significant challenges for the education system also in Slovenia.

A founding principle of inclusion is to give children with special needs equal opportunities to participate fully in regular education classrooms with children who do not have any special needs. It expresses commitment to educate each child, to the maximum extent appropriate, in the school and classroom they would otherwise have attended. However, studies have shown that for some students with special needs, placement in regular education classrooms without appropriate social supports has resulted in social isolation and, ultimately, a more restrictive environment with lower school achievement (Celeste, 2007; Sacks et al., 1992). Therefore, classroom teachers need to make the development of social competence a priority for children with special needs. Efforts to include students with special needs are most effective when teachers are actively involved in assessing the students and helping them acquire appropriate social skills. Inclusive intervention strategies of parents and teachers enhance the social development and school achievement of children. It is also important that the children's ability to implement these skills successfully is carefully monitored (Celeste, 2007; Kekelis & Sacks, 1988; Sacks et al., 1992).

Early intervention as the first step on the path to inclusion

Preschool period of a child's life is a decisive factor for their further development, for biological, physical, cognitive and social development as well as for

personality development (Hatwell, 1985; Leclerc et al., 2000; Vasta, Haith, & Scott, 1995; Warren, 1984, 1994). Almost all the research clearly shows in each case the importance of this early period for the child's quality of life (Harris, 2008). A child with special needs requires a whole set of additional incentives in order to gradually compensate for their shortcoming from the time of birth onwards. Research (Alexander, 1996; Beaty, 1991; Bigelow, 1995; Rodriguez, Sabucedo, & Arce, 1995) also warns that positive self-concept, which a child develops from the earliest childhood onwards, is the very factor that is the most decisive for how a child will embrace their difference and live with it.

Research from the field of pediatrics and psychology (Bailey & Powell, 2005; Bruder, 2005; Guralnick, 2005a, 2005b) shows that professional support received by children with special needs in the early period of their life as well as by their parents is fundamental for their later inclusion into social environment.

In 2005, *The European Agency for Development in Special Needs Education* adopted a definition of early intervention, which was the result of findings made by different authors (Guralnick, 2001; Soriano, 2005). In this document, it is stated that early intervention is a set of services of different professions, intended for very young children and their parents. The services are available for the families at their request, that is, when they need them, and they encompass every type of help connected to special needs of a child. The intention of an early intervention is to ensure undisturbed personality development of children, empowerment of a family and social integration of children and their families into a wider social context.

Early intervention of children with special needs and their parents represents the first step on the path to inclusion, which signifies ensuring equal opportunities for those with disabilities in education, at work, in partnership and life in general (Bishop, 1996; Kekelis, Sacks, 1988; MacCuspie, 1992; 1996). In many authors' opinion (Guralnick, 1997; Nicaise, 2000), early intervention is crucial also from the point of prevention of further possible social and economic exclusion of children and later adults with special needs. Consequently, the families that enjoy full early intervention have bigger possibilities for establishing and maintaining the quality of life and psychological well being, while health and psychophysical development of their children progress.

Socio-cultural theory of Vygotsky and inclusion

Roots of socio-cultural theory

From practical point of view, inclusion can provide improvement for the quality of education and social life for children with special needs. How-

ever, the principles of inclusion need to be understood within a suitable theoretical framework, namely within the theory of Vygotsky and other emerging social constructivist perspectives.

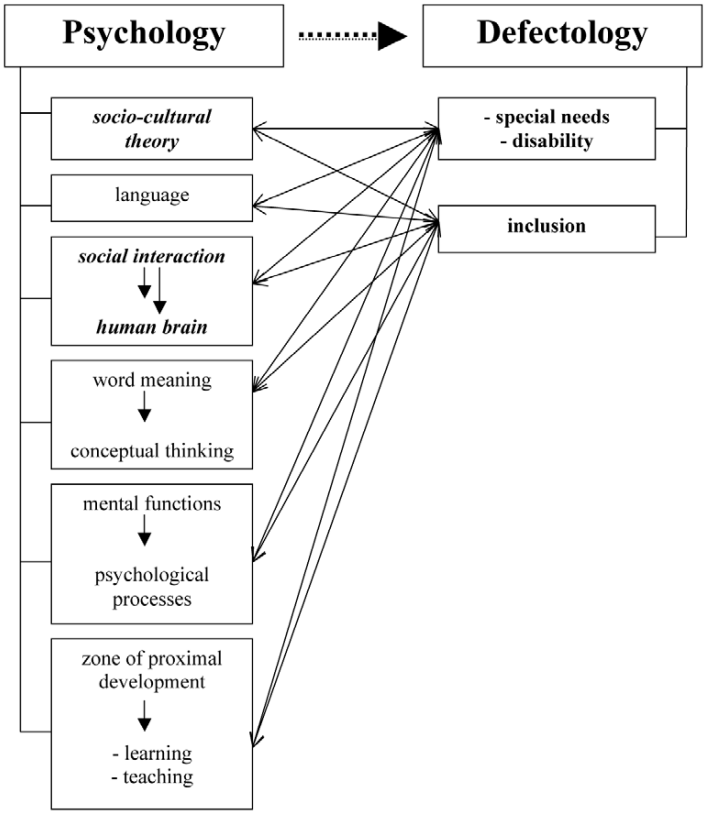

Figure 1: Basic concepts and thesis and their interrelationships of socio-cultural theory in the light of Vygotsky's psychology and defectology.

The theory of Vygotsky made a strong impact in the field of psychology since its beginning in 1924 (Marjanovič Umek, 2010). He developed many concepts and theses that have been inspiring psychologists almost a century later, such as:

- The central precept of socio-cultural theory is the co-construction of knowledge, between the individual and social processes (John-Steiner & Mahn, 1996),
- The role played by language and other symbolic systems,
- The function of social interaction in the development of the human brain,
- The role of word meaning in complex and conceptual thinking,

- The relationship between elementary and higher mental functions in the development of psychological processes,
- The concept of the zone of proximal development to explain learning and teaching. (Mahn, 1999).

In the current article, we are focused on two of them: (1) the concept of socio-cultural theory, as well as (2) the function of social interaction in the development of the human brain. We attempt to integrate them in the understanding of special needs and inclusion (Figure 1) because we find them to be crucial in explaining the role of brain reorganization (due to brain plasticity) in children with special needs.

In 1929, Vygotsky wrote a book "The Fundamentals of Defectology: Abnormal Psychology and Learning Disabilities" (Rieber, Carton, 1993) in which he developed the concept of defectology. The theory is based on the idea that human development is the process of a child mastering their experiences in their social environment. The adult and the child's peers play an important role of continual guidance and meaningful relationships during this process. Vygotsky argued that "defects" should not be perceived as abnormality, but need to be brought into social context. He criticized special education as a combination of low expectations and diluted curriculum, and he challenged all educators to have a "positive differential approach" of identifying the children's strength not their disability.

(Mis)interpretations of Vygotskyan ideas

On the first sight, it seems surprising that his work on defectology had not been translated into English until 1993 when Rieber and Carton edited and published "The Collected Works of L.S Vygotsky". In his work, we could discover many modern and democratic explanations of inclusive education and early intervention as well as his progressive concepts of terms such as "disability", "special needs" etc. Furthermore, we could find those ideas in the International Classification of Functioning, Disability and Health (ICF) designed by WHO (http://www.who.int/classifications/icf/en/, 11.2.2012), that include environment and personal factors rather than the medical diagnosis as well as in modern legislations about the education of children with special needs. Of course, Vygotsky was deeply influenced by Marxism and in some texts he even declared his psychology as Marxist psychology (http://www.marxists.org/archive/vygotsky/index.htm, 11.2.2012). Ironically, in his own country, the Soviet Union, he was strongly criticized by the communist party and after his death; Stalin erased his name from all scientific journals in the Soviet Union (Marjanovič Umek, 2010). However, for the western world it was the influence of Marxism in his theory that caused such a postponed translation of his work.

It was different in Eastern Europe. For example, in former Yugoslavia the translation of his book "The Fundamentals of Defectology" had been made even a decade before the English translation (Vygotsky, 1983). But the interpretation of his works remained within the context of Marxism and was spread out with the idea of segregated schooling of children with special needs. Therefore, the inclusion in Eastern Europe has either a short history or worse, it does not have any history at all.

Organization of higher mental functions and socio-cultural understanding of disability

No matter how political influences determined the development of Vygotskian theories, it is undoubtedly true that today Vygotsky is recognized as one of the founders of the psychology of disability and benefits of inclusive education. As it is seen in Figure 1, we are focused on two concepts, such as socio-cultural development, as well as the function of social interaction in the development of the human brain, which are crucial for understanding the correlations between inclusive settings and brain capability of plasticity. He already had a premonition about these correlations in "Problems of the theory and History of Psychology" (1993) where he described a new psychology as a division of the general biology and as well as the basis of all sociological sciences.

In his theoretical platform, the organization of higher mental functions has two principles:

- Systemic,
- Dynamic.

Systemic organization of higher mental functions

The systemic organization of higher mental functions means that "... no specific function is ever connected with the activity of one single brain centre. It is always the product of the integral activity of strictly differentiated hierarchically interconnected centres" (1997a, 140). Luria's (1966) understandings that deepened the development of the principle of systemic organization of higher mental functions, in further research allowed determining the localizations of those mental functions in brain and so the studies of the components of brain functions began. Considering the systemic character of higher mental functions, Vygotsky discussed also disability. Within this context, he distinguished between two types of disabilities: primary and secondary.

For Vygotsky, a child with special needs is not a disabled child. He regarded disability as:

- A socio-cultural developmental phenomenon,
- Being composed of two types of disabilities: primary and secondary.

The regard of disability of socio-cultural phenomenon comes from the understanding that all higher mental functions have social roots. He wrote that "...every function in a child's cultural development appears on the stage twice, on two planes, first - social, then - psychological; first between people as an inter-mental category, then within a child as an intra-mental category" (Vygotsky, 1997b, 106).

The primary disability is an organic impairment and as such it may limit the acquisition and the use of some social skills and it means that children acquire knowledge at a slower rate. The secondary disability arises from distortions of higher psychological functions due to negative social factors. Vygotsky correctly assumed that it is the child's social milieu that may severely limit the course of development and lead to delays or differences that are characteristic of many people with disabilities. Therefore, he named the secondary disability as a socio-cultural disability (Vygotsky, 1993). He explained that the many behavioural traits such as passivity, dependence and the lack of social skills that might characterize children with special needs are in fact the product of poor access to socio-cultural knowledge, lack of social interaction and opportunity to acquire psychological tools. As a result of the primary disability, expectations and attitudes change access to social experiences leading to the development of the secondary disability.

Children with the secondary disability can develop "compensatory reorganization", which means that they can adopt their higher mental functions in a positive or negative direction. For example, a child with special needs might develop a series of maladaptive behaviour, such as passivity, dependence, aggression etc., which is due to negative adaptive compensatory organization of higher mental functions. On the other hand, if they are surrounded by positive social incentives and inclusive educational settings, the same child could develop self-regulated functions, such as self-commands, self-discussions of the school task, that all lead to positive reorganization of higher mental functions. Of course, this could not be processed without the pedagogical help, as Vygotsky stated, or rather, without inclusive education. In order to prevent or remediate the development of the secondary disability, Vygotsky proposed that changing social attitudes should be one of the first goals of special educators (Gindis, 2003). At some point, he also included the role of personality differences among children, which are important for their inclusion (Das, 1995).

Dynamic organization and localization of higher mental functions

Dynamic localization occurs due to:

- The modification of the structure of functions through child's development,

- The modification of the functional structure depending on the level of automatization, and
- The possibility of using different means to achieve the same result (Thal et. al., 1991).

Dynamic localization of brain functions could have two opposite tendencies:

- Negative tendency,
- Positive tendency.

Negative tendency means that a child's partial impairment can cause a significant underdevelopment of a number of brain functions. In Fundamentals of defectology (1983), he wrote about the consequences of lesions with the same localization in children and adults. In children, and it is not the case in adults, overlying operations that require participation of the affected component in their development are usually more affected. That means that a child's partial impairment can cause a significant underdevelopment of a number of higher mental functions.

On the contrary, the positive tendency of dynamic localization of brain functions means to substitute and create new inter-functional connections. The formations, which emerge much later on and are less connected with the primary derivate factor, are easier to eliminate with the help of educational influences.

These two tendencies are in constant competition with the process of child's development.

Neuropsychological contributions

Brain plasticity

The basic concepts of neuropsychology - "higher mental functions" and brain functions were developed by Vygotsky. They are referred to as higher psychological functions, which are known in his works.

Negative tendency of dynamic localization of brain functions as described by Vygotsky are today in neuropsychology very well known as the "cascading effect", while the positive tendency of dynamic localization of brain functions is recognized as "brain plasticity". In spite of the fact that he conducted much more "simplified" experiments and studies for our time, it is obvious that he already determined the principles of those two important effects which are responsible for a child's development (Karmillof-Smith, 2002). However, it was not so obvious until the early 1990's when the development of neuroimaging tools allowed researchers to probe inside the brain in a non-speculative as well as non-invasive (chirurgic) manner. At that time, the postulations of brain functions of Vygotsky became a reality.

Brain plasticity is the term which was already defined in the middle of the last century, namely in 1949, when D. Hebb explained it in the book

"The organization of Behaviour" (1949). Today, the term refers to the brain's ability to change throughout life. The brain has the ability to reorganize itself by forming new connections between neurons. In addition to genetic factors, the environment in which a person lives, as well as the actions of that person, plays a role in plasticity. Brain plasticity occurs in the brain in three different contexts:

- At the beginning of life and in early childhood: when the immature brain organizes itself,
- In cases of brain injury: to compensate for lost functions or maximize remaining functions,
- Throughout lifespan development whenever something new is learned and memorized.

There has been quite a lot of research done in the area of reorganization in brain functions after brain injury (for example Saur et. al., 2006 etc.). Studies have shown that the brain activity associated with a given function can move to a different location as a consequence of brain damage or recovery. However, early childhood and learning are of the main importance for our article and for what Vygotsky hypothesized as the positive tendency of dynamic localization of brain functions.

Research on learning and memorizing showed that in fact the brain never stops changing through learning. Plasticity is the capacity of the brain to change with learning. Changes associated with learning occur mostly at the level of the connections between neurons. New connections can form and the internal structure of the existing synapses can change.

The brain constantly changes and yet, despite the fact that it can undergo extensive modifications in basic morphology, connectivity, physiology, or neurochemistry, manages to preserve stability and continuity (Merabet et al., 2009). The potential for change is itself not static, as it varies dramatically throughout the course of life. This potential is at its highest in early childhood. The developing brain is a highly dynamic system which undergoes several distinct phases, from cell formation to the rapid growth and subsequent elimination of unused synapses before finally entering into a more stable phase following puberty (Chechik et al., 1998).

Recent spate of studies

According to the classical concept of sensorimotor control, perception is considered as the input from the external world, action as the output from the brain to the external world, and cognition as the intermediary process. So, classical models state that deficits and defects in brain functioning could be final and "non-serviceable". On the contrary, the results of a recent spate of studies suggest that perception, cognition, and action are interrelated and

continuously influence each other. They indicate that cognition and action share common neural mechanisms and are interrelated as it is shown in Figure 2 (Gallese, Fadiga, Fogassi, & Rizzolatti, 1996; Imamizu, 2010). The Figure shows that perceptual and cognitive functions include various functions ranging from very early sensory processing to high order cognitive. The brain regions that may be related to the functions as perception, cognition and action include not only cortical regions such as the frontal, parietal, and temporal regions but also the sub-cortical region (cerebellum).

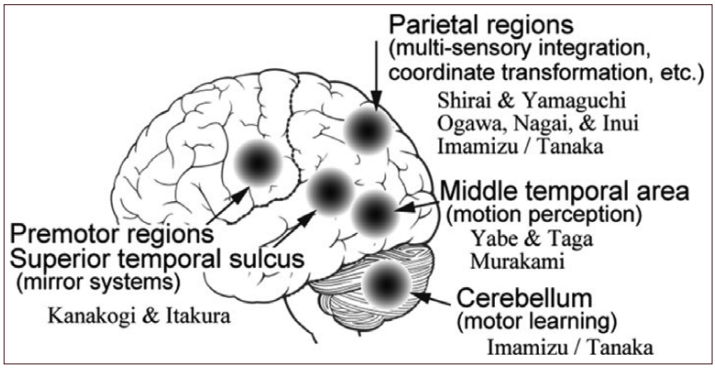

Figure 2: Brain regions (blobs) that may be related to the integration of perception, cognition and action (Adapted from Imamizu, 2010).

Other new studies show that there is growing evidence that sensory deprivation is associated with cross-modal neuroplastic changes in the brain. Merabet & Pascual-Leone (2010) found that sensorial deprived individuals show a massive reorganization of function in cortical areas normally dedicated to vision. After visual or auditory deprivation, brain areas that are normally associated with the lost sense are recruited by spared sensory modalities. A very recent research by Voss et al. (2011) also shows that these brain reorganizations are accompanied by behavioural enhancement.

Conclusions and suggestions

Let us finally interweave all the important issues of this article, which we have tried to integrate in Figure 3.

First of all, a founding principle of inclusion is to give children with special needs equal opportunities to participate fully in everyday life activities and in regular education classrooms with children who do not have special needs. From practical point of view, inclusion can provide improvement for the quality of education and social life for children with special needs. It is the theory of Vygotsky and other emerging social constructivist perspectives that explain the main principles of inclusion. His theory clearly explains the organization of higher mental functions, both systemic and dy-

namic. It shows compensatory reorganization and adaptation, as well as the positive dynamic organization of brain functions. That issue is present and studied in contemporary neuropsychological explanations of so-called brain plasticity effect.

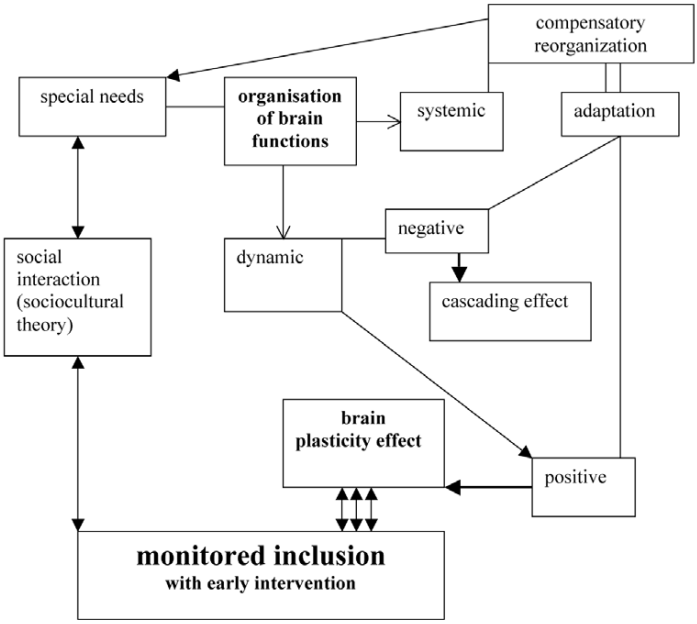

Figure 3: Integration of sociocultural theory of Vygotsky and neuropsychological approaches to brain plasticity in the context of inclusion of children with special needs.

Therefore, we could conclude that only within positive and carefully monitored inclusion, which starts with early intervention, can the brain of a child with special needs reorganize in the way that they could fully participate in the everyday life experiences. The brain with its unique ability of plasticity offers a child that within inclusive settings could develop all the necessary compensatory strategies for their everyday life functioning as a consequence of development of brain plasticity changes.

Inclusion of children with special needs has a high impact on positive adaptive compensatory reorganization of brain functioning, namely brain plasticity. We believe that one condition needs to be fulfilled: children with special needs could benefit from inclusive settings also in their brain development from the moment their special needs are identified - that is from birth.

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This paper discusses the concept of inclusion of children with special needs from the context of contemporary findings in neuropsychology as well as from the context of the psychology of L.S. Vygotsky and his theory of socio-cultural development. In contrast to the classical physiological models that treated deficits and defects in brain functioning as final and "non-serviceable", the contemporary neuropsychological advancements show the significance of brain plastic changes, which enable the development of new and integrated responses in the cortex centres that allow compensatory functioning of an individual. The socio-cultural theory of Vygotsky underlines the social roots of higher mental functions. It hypothesised that only within inclusive settings would children with special needs develop all the necessary compensatory strategies for their everyday life functioning as a consequence of the development of brain plasticity changes.

Key words: inclusion, Vygotsky, socio-cultural theory, neuropsychology, brain plasticity

Darja Kobal Grum

Koncept inkluzije v socio-kulturni teoriji Vygotskega in neuropsihologiji

Prispevek obravnava koncept inkluzije otrok s posebnimi potrebami v vsakdanje življenjsko okolje z vidika sodobnih znanstvenih spoznanj na področju nevropsihogije in jo umešča v kontekst psihologije L.S. Vygotskega in njegove teorije socio-kulturnega razvoja posameznika. Ugotavlja, da za razliko od dotrajanih in preseženih fizioloških modelov, ki so okvare ali primanjkljaje v možganskem delovanju predpostavljali kot dokončne in "neuporabne", sodobne nevropsihološke raziskave kažejo, da se v možganskih centrih, ki so primarno namenjeni za porajanje povsem specifičnih funkcij, razvijajo zaznavne in kognitivne funkcije, katerih izvor je sicer drugje, in s tem okrepijo delovanje teh možganskih centrov. V skladu s kompleksnim razumevanjem psihologije Vygotskega, iz katere vejeta poudarek na socialnih izvorih kognitivnih funkcij in pomen kulturnih procesov pri razvoju kognitivnih sposobnostih, sklepamo, da je za optimalen psihosocialni razvoj otrok s posebnimi potrebami ključnega pomena prav učinkovita inkluzija, ki temelji na premisah individualiziranega učečega se okolja.

Ključne besede: inkluzija, Vygotsky, socialno-kulturna teorija, neuropsihologija, prilagodljivost možganov