

# Editorial: The Relation between Inclusive and Cognitive Education and New Insights in Brain-Gene-Environment Interaction

JO LEBEER<sup>1</sup>

In 2006 the United Nations adopted a Convention on the Rights of Persons with a Disability, a milestone of the calibre of the Human Rights Convention in 1948. According to Article 24, children with disability have the right to participate and receive high quality education in regular schools. Inclusive Education has become a world-wide standard. There is no more doubt, at least from a juridical or a human rights point of view. States which ratified the Convention (130 up till now) have the obligation to take the necessary measures and create conditions to grant their citizens that right to be educated in a regular environment, including the necessary reasonable adaptations in curriculum and environment, as well as to adequate support. Many countries changed their education laws and provisions. However, there is a widespread difference in the degree of implementation of inclusive education, and even in the understanding and application of its principles in practice.

In 2006, just before the mentioned Convention, the Transylvanian Journal of Psychology published a Special Issue on this topic based on the results of the European InClues project (Pokorna & Lebeer, 2006). Now is the time to make a scientific update.

Why a special issue on the combination of both topics: inclusive education and cognitive activation? Apparently they have little to do with each other; one is pedagogy, the other (neuro)psychology and cognitive rehabilitation. What is the bridge?

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1. MD PhD, associate professor, University of Antwerp (Belgium) & Babes-Bolyai University, Cluj-Napoca (Romania);

Corresponding address: University of Antwerp, Faculty of Medicine & Health Sciences, Department of Family Medicine & Interdisciplinary Care, Project INCENA Inclusion & Enablement. Jo.lebeer@uantwerpen.be

Inclusive education, when it is well done - as is outlined in the paper of Sheehy et al. in this issue - may have an important impact on the development and learning of a child “experiencing barriers to learning”, as well as on typically developing peers and on the teachers. The name shift from “children with special educational needs” to “children experiencing barriers to learning” (Booth et al, 2011) already indicates a shift in thinking: from a merely child-oriented perspective, towards a more environmental perspective. The barriers to learning a child experiences, may originate in the child’s neurological functioning, but may also be due or reinforced by environmental barriers, e.g. in attitudes or (lack of) competences of teachers, peers, parents, (lack of) assistance, material support, etc. This shift of thinking is now well represented in the ICF-CY conceptual framework (International Classification of Functioning), which is discussed in this special issue by Saragoça et al. Inclusive education is a cultural process, taking place on many levels. Several papers in this special issue report about this shift in children and teachers.

With cognitive development we want to give an expanded meaning as compared to its usual meaning of the development of knowledge and academic skills. These are secondary to the development of more transverse cognitive skills or executive functions, such as: the ability of sustained attention, to refrain from impulsive behaviour, to expand working memory, to compare and to use an enriched language. Cognition is a basis for learning in the broadest sense - including also social-emotional learning, creativity, musicality and other intelligences, which are not usually considered to have much to do with cognition. This development takes place in family, community and school. If there is a lack of mediation in this respect, cognitive development may be hampered. An inclusive environment, by exposing everyone to multiple challenges (to adapt, to learn, to relate, etc.) is certainly a “cognitively complex environment”. According to Steven Ceci (1986) cognitive functions are only developed in an environment which is sufficiently complex. Therefore, theoretically, a better cognition should lead to a better inclusion. Many researchers found that indeed this is the case. But what about modifiability of cognition? We want to go beyond merely passively observing that those having better cognition have more chances to be included.

An example of the profound impact of an inclusive cognitively complex environment can be seen in the increasing number of people with Down syndrome who, despite of having a diagnosis of intellectual disability, suc-

ceeded in getting to a cognitively high functioning state, as for example obtaining a high school, professional, or even university degree, or a driver's licence. When one analyses their biographies either written by themselves (e.g. Engels, 2006) or by their parents (Felea, 2011) or interviews (Pineda, 2010), they have in common that (1) they all went to a regular school; (2) they had very stimulating and challenging parents; who mediated to them thinking-, language-, coping-, socio-emotional and academic skills, and gave them a lot of learning opportunities in this respect; (3) their parents succeeded in convincing others – teachers mainly – to also become cognitively challenging, who gave them more than average learning experience to become proficient in academic and thinking skills; (4) they did not grow up in an overprotected, simple environment and (5) they became responsible citizens with a contributing role in society. These characteristics all summarized in Feuerstein's concept of "active modifying environment" (Feuerstein, 2002). Interestingly, in these three described case histories, there is evidence that they were not particularly high functioning in the beginning, or cases of mosaic Down syndrome. So the usual argument that high cognitive development is simply a result of better genetic predisposition, does not stand. This means that there are good arguments their high cognitive development is, at least to an important extent, the result of environmental enrichment. In this Special Issue another example is analysed by Verreyt et al., of a group of young people with Down syndrome who took a course in "learning support assistance for kindergarten. Their study suggests that participation to an inclusive course, followed by regular employment in an inclusive workplace, not only is beneficial for their quality of life, but it also expands the mind of the adult participants, not only of those with intellectual disability, but the whole environment.

Hence, the question is not so much if there is a link between cognitive activation and inclusive education, but how. If we have a better understanding of the "how", it might be able to replicate similar results. Nowadays there are several scientific fields which provide a theoretical basis of understanding a link between cognitive activation, inclusive education and resulting high cognitive development.

The first is the field of neurosciences and the study of neuroplasticity, which shows increasing evidence that the brain continues to make new connections at all ages, and the undeniably positive effect of being raised in "environmental enrichment conditions". We termed this "ecological plasticity",

in the sense that the brain's plasticity mechanisms are highly influenced by the individual's ecology (Lebeer, 1998). An inclusive school may be seen – under certain conditions as outlined in this issue – as an educationally enriched environment.

The second is the theory of Structural Cognitive Modifiability and Mediating Learning Experience (Feuerstein et al., 2002), which provides a theoretical framework as well as practical applicability to enhance cognitive development. In this theory, higher order cognitive functions are seen as the result of adequate mediated learning experience, whereby a human being intentionally interferes to adapt the incoming stimuli (input), in order to make them “digestible”, to help with elaboration and to adapt the way answers are expressed (output). We can now assume that teachers (as well as parents), in their role of mediators, act somehow as “closed brain surgeons” in the sense that they really contribute in creating new brain connections.

Thirdly, there is a growing scientific field of epigenetics, which studies the effects of the environment (from cellular environment, to brain networks, to living environments) on the regulation of gene transcription. Epigenetics may offer the explanation of the phenomenon of ecological plasticity. E.g. In the case of Fragile X syndrome, a genetic anomaly in boys which is associated with intellectual disability, impulsivity, autistic tendencies and language development difficulties, the genetic mechanism leading to abnormal brain network construction is well known; the repetition of genes disturbs the construction of Rho proteins, which in itself disturb synaptic dendrite plasticity (Ramakers, 2002). In Fragile X mouse models however, it has been shown that activity may partly compensate this deleterious effect, by epigenetic mechanisms controlling gene expression. There is also evidence of the influence of environmental input and affective experience on the formation of the social brain in early childhood (Korkmaz et al, 2013), which in many children nowadays is somehow hampered.

These new insights in brain-gene-environment interaction have important consequences for parents, teachers, therapists and whoever is involved in education and developmental activation of children with developmental impairments.

However, many questions remain, for example:

- How effective is inclusive education (as compared to special schools) regarding learning of primary academic skills (reading, writing, and mathematics), general knowledge acquisition, social skills development and autonomy, cognitive development?
- What variations in application of inclusive education practice exist within countries and between countries and how are they evaluated?
- Regarding assessment of “additional educational needs”, functional evaluation and evaluation of academic achievement: what kinds of adaptations are needed and are effective?
- How can adaptations and support be effectively organized in an inclusive way, meeting the needs of inclusive participation and the needs for optimizing development and learning?
- What kind of support is most effective; what is the quality of support in regular classes?
- What competences are required of the various professions involved in realizing inclusive education: regular teachers, special teachers, other supporting staff?
- What is the role of cognitive activation in inclusive education and the effectiveness of possible specific cognitive activation programmes in this respect?
- What kind of didactic methods regarding literacy and numeracy are most effective with children with difficulties in this respect?
- What are critical success and failure factors regarding inclusive education?
- What educational ICT technologies can contribute to the realization of inclusive education?

Some of these questions will be addressed in this issue.

First, David Mitchell presents an evidence-based approach to teaching learners with special educational needs and disabilities in inclusive educational settings. The criteria that should be met in research studies are briefly described. This is followed by an overview of evidence-based teaching strategies that have high ratings. A total of 20 strategies are arranged under four headings, according to their predominant underlying assumptions about how learning takes place: social, behavioural, constructivist and mixed.

A theoretical foundation for the link between cognitive activation and inclusion is given in Dorothy Howie's paper, which starts from Bronfenbrenner's updated ecological theory, mapping some key principles linking inclusive and cognitive education. It then presents a three-tiered model for the inclusive teaching of thinking within that ecological theoretical framework, with an example of how one school community has considered that three-tiered model in terms of the needs of all of its learners for cognitive education.

Praet & Desoete give an example of Howie's theory how cognitive activation leads to more inclusion, from a very young age: their results indicate that a short and intensive intervention of playing ICT educational games filled the gap between children at-risk and peers without additional education needs. Mathematic skills of kindergarteners increased, with training effects that were persistent in grade 1.

Storbeck and Martin summarize Deaf Education in South Africa and the USA in terms of the transformation that it has passed through: —from an entirely separate educational system, to one which aims at more inclusion. They raise questions regarding the way in which inclusion is interpreted. In the case of Deaf Education, they state that neither the special education in special settings, nor the inclusive options are sufficiently meeting Deaf learners' needs. However, the incorporation of a cognitive education programme, in acquiring transversal learning skills, offers hearing-impaired learners the opportunity to truly meet the goal of preparation for the future—in academic, social, family, and work lives. They conclude that cognitive education should have a significant curricular position.

Sheehy makes a similar case for children with autistic spectrum disorder: she criticizes the widely held view and practice that it is better to create special settings. She argues that the evidence for such special "ASD" education is generally weak. From her research in 10 countries all over the world, she concludes that it is very well possible to educate children with ASD in mainstream settings. She also gives the characteristics of a truly inclusive pedagogy. If one understands how to teach children with ASD, then more typically developing children greatly benefit.

Demeter also writes about conditions to create good inclusive education. In her paper she compares the social context of acceptance and rejection of typically developing and children with a label of special educational needs SEN. There might be different reasons of rejection, but secondary and long

term consequences are similar for whether or not children are labelled disabled or not. She presents effective buffering techniques and strategies for prevention of prejudicial attitudes. This also links to the ICF which considers attitudes as important “external factors” contributing (positively or negatively) to disability and functioning.

The paper of Hutchings & Mortimore reports about an intervention study for early literacy acquisition in “vulnerable” learners living in the UK, who have English as a second language. They start from a critique on the “medical model” approach, adopted by most dyslexia and “specific learning disability” specialists, both practically in promoting diagnostic assessment, labelling learners and focusing support upon multi-sensory programmes for individuals delivered by experts. Their intervention with computer based reading programmes was “simple”, within classroom, and done by teaching assistants. The results suggest that short- term, daily, focused interventions, delivered by trained teaching assistants are highly effective in increasing literacy in at risk bilingual learners. Moreover, they showed that the less measurable dimensions of learning, emotion and environment play a key role in developing appropriate responses to literacy difficulties.

The problem of assessment is dealt with in two contributions. First Lebeer et al. give a summary of the results of a European project (the “Daffodil project”), which searched for more inclusive alternatives to classic assessment procedures, which they criticized for being too negative and excluding, thus conspiring with leaving children behind. They present criteria for good practices for assessing children’s true educational needs in a more dynamic, inclusion-oriented and contextual way, oriented at discovering learning potential; they suggest a number of approaches responding to these criteria. Furthermore, they report a qualitative research process to arrive at guidelines and a flow-chart. Salas et al. report a concrete application of this approach in Chile in South-America, in which they showed that children at risk of educational failure, if evaluated in a dynamic way – they used Feuerstein’s LPAD – improve their performance dramatically, thus giving their teachers a more optimistic outlook and counter-acting negative prejudice.

That the teacher is crucial to successful inclusion is again illustrated in the papers of Vandeputte & De Schauwer and the one of Saragoça et al.. Vandeputte & De Schauwer examined teachers’ experience with inclusive education in preschool, primary and the beginning of secondary education in Belgium. For the teachers the question has shifted from ‘what is wrong with

this child?’ towards ‘what is necessary to let the child participate in our group?’ It has profound impact on them, opening up new insights and resulting in teachers’ becoming different teachers than before. This is a very important finding, because in many places resistance against inclusion is often formulated in terms of “teachers are not ready for inclusion”. This paper shows they can become ready. Theoretically it is also a relevant paper because it questions the thinking about difference as a categorical difference (as expressed in labels as .e.g. “intellectual disability”), to difference as emergent continuous difference. Their paper shows that it is possible – as is suggested by Demeter in another article in this issue – to prevent and buffer teachers’ prejudice.

On the other hand, Saragoça et al. show that teachers, even those who are already specialized in special needs education, need a more substantial and continuous professional development to become “acculturated” to a new thinking about disability, not in terms of medical deficiencies, but in terms of bio-psycho-social functioning, as is laid down in the ICF, which has been adopted as “the” frame of reference to assess children with disability in Portugal. Implementation of such a new paradigm is not a quick and easy process.

The psychology of adolescents with special needs in a situation of inclusion is the subject of a paper by Simona Hoskovcová and Lenka Krejčová of Charles University in Prague. They studied self-efficacy as a resilient factor in periods of transition and the role of significant educators who may fundamentally affect pupils’ coping with transitions.

Finally, Janos et al. report some preliminary experiences of their work at the recently established Feuerstein Centre of the Psychology Institute of the Babes-Bolyai University in Cluj-Napoca, with cognitive activation methods based on mediated learning experience intensification, in children with a history of educational failure and at risk of school dropout. Although preliminary, results are promising and significant in the sense that they show a “way out” – or should I say a “way in” – of a widespread cultural habit of leaving behind children from ethnic minorities who habitually do not perform well at school. By helping the children to adopt better thinking strategies, their teachers are losing their negative prejudice, a real illustration of the Pygmalion effect. It is a confirmation of Howies’ three-tier thinking skills strategy discussed in this issue.



In conclusion, both the concept of inclusive education and that of cognitive education are often badly understood. We hope that this Special Issue contributes not only to a better understanding what they truly mean, and what they imply; we also hope that their scientific evidence will become more solid. The fact that the UN Convention has been mentioned many times in this Special Issue, means that it has made a profound impact in the minds of those who feel the need to help with its implementation. And above all we hope that this Special Issue will “shake the minds” of those in charge of children “experiencing barriers to learning” so that they will become better learners in a more inclusive educational environment.

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