STUDIA UBB PSYCHOL.-PAED., LX, 2, 2015, p. 5 - 17
(RECOMMENDED CITATION)

Opinion article

EMBODIED LEARNING: CONNECTING PSYCHOLOGY, EDUCATION, AND THE WORLD

THEA IONESCU[1] & ADINA GLAVA[2]

ABSTRACT. This opinion article is aimed to bridge new approaches in psychology with the efforts to change schools that are widely advocated in educational sciences. To reach this aim we review the embodied cognition approach and the problems that schools face today, and then we argue for the role that embodied learning might play in the process of changing education as it is pursued today. We conclude with ideas on the importance of putting the learner back in the world when he/she learns in order to be able to better adapt to the world.

Key-words. *Embodied cognition, embodied learning, grounded teaching, imaginative education*

ZUSAMMENFASSUNG. Dieser Artikel ist eine Stellungnahme, die darauf abzielt, neue Ansätze in der Psychologie mit den Bemühungen den Schulen zu verändern, die weit verbreitet in Erziehungswissenschaften vertreten sind, zu überbrücken. Um dieses Ziel zu erreichen, überprüften wir die verkörperte Erkenntnisansatz und die Probleme, mit denen Schulen heute konfrontiert sind und dann, behaupten wir auf die Rolle, die verkörpertes Lernen in den Prozess der Veränderung der Bildung, so wie sie heute betrachtet wird, spielen kann. Der Abschluß besteht aus Ideen über die Bedeutung die Lernenden zurück in der Welt zu stellen, damit sie in der Lage sind, sich besser an die Welt anzupassen.

Schlüsselwörter: *verkörperte Kognition, verkörpertes Lernen, gegründeter Unterricht, phantasievolle Bildung*

[1] *Department of Psychology, Faculty of Psychology and Sciences of Education, Babeș-Bolyai University, Cluj-Napoca, Romania, Email: theaionescu@psychology.ro*
[2] *Educational Sciences Department, Faculty of Psychology and Sciences of Education, Babeș-Bolyai University, Cluj-Napoca, Romania, Email: adina.glava@ubbcluj.ro*

Learning

Learning is one of the fundamental issues in psychology and education, and yet a poorly understood one. Humans learned since their existence on Earth and their learning produced the most amazing advances in the world. However when science tried to explain what is learning progress was much slower.

Psychology has made a lot of advances in analyzing the process of learning, and has accumulated data on conditioning (via the behaviorist approach, Skinner, 2005), on the cognitive processes that are involved in learning (via the cognitivist approach, Byrnes, 2001), and also on the role of the social context in the learning process (via the social constructivist approach, Palincsar, 1998). For example, we know that reinforcements work but also that we don't have to give only positive feedback due to concerns for the child's self-esteem, but to offer accurate feedback to have efficient learning outcomes (Poole, Nunez & Warren, 2007). Also, we know that metacognitive skills are essential for high performance (Schneider, 2008). With regard to the social elements that influence learning, we know that schools that are organized as "communities of learning" have higher success because they involve the group in the learning process and offer meaning to learning from the group values (Palincsar, 1998). However, when it comes to applying research data to education and have children learn better and find meaning in school settings, the results are not that straightforward. Some authors even argue that psychology did not find yet "an account of learning that can explain how humans come to understand, particularly understanding that is grasped meaningfully." (Stolz, 2015, p.11).

At any given time, the educators' understanding of what effective school learning situations mean is informed by the theories on how general learning occurs. Thus, classical educational systems developed a long tradition of a Piagetian approach in conceptualizing learning and cognition in school age children. This cognitivist approach stands at the very base of structuring the educational systems themselves (different school levels are associated with the Piagetian stages of information processing). While recognizing the valuable references that contributions of Piaget offered to the understanding of cognitive development and the important implications they have for the present understanding of how school learning could be supporting at different school levels and ages, we argue that the Piagetian model invites educators to categorize the school learning means

and instruments according to their main utility in different school ages and, consequently, to disregard the instructional potential that early ages instruments continue to have in supporting learning that more advanced ages students perform.

Thus, while teaching practices at preschool and primary school levels are saturated in means that support the direct interaction of students with aspects of reality the child is to understand, starting with the last years of primary school and throughout the lower secondary school there is an obvious focalization on overpassing the use of concrete thinking tools and supporting the development of formal cognitive operation through highly abstract teaching. Starting with these ages, at the school curriculum level, many highly valued school subjects include abstract, depersonalized and decontextualized learning contents (Cucoş, 2014), associated with education as symbol manipulation. Most of the school contents are emptied by the aspects that could physically, emotionally or creatively involve students in the construction of meanings. Students tend not to recognise the relevance of the academic contents for real life problem solving, and even though sometimes they are successful with this type of learning, the results prove not to be persistent in time or transformative. The long-time consequence is their lack of involvement and self-responsibility for their own learning as well as their lack of motivation for learning in general and for certain more abstract school subjects in particular. Some of the latest international evaluations such as PISA 2012 (Programme for International Student Assessment, 2012) highlight these realities for the Romanian 15 year old participant students.

On the other hand, school learning represents a particular type of learning, supported by external factors that act as mediators of the process (Engeström, 2014) and are articulated in the so-called school culture. The traditional schools of nowadays society promote a school culture that reflects the general western mentality on schooling, students and learning. At the core of this institutional culture stands the model of school as an industrial production line (Robinson, 2011). It is a structure, initially justified by economic reasons, that proved to have many important shortcomings because of its linearity, conformism, and antisocial orientation (Robinson & Aronica, 2015) and that is increasingly criticized by the promoters of the alternative more ecological model to

education and learning. Thus, to the industrial model of schooling it is opposed the agricultural, organic model that recognizes the fact that human beings do not develop in linearly and totally predictable directions but in diverse and unpredictable ways that value the educational potential of school contexts in various manners. The main principle beneath this model is the fact that in the right school context focused on the promotion of individual wellbeing, the ecological approach to individual development, the activation of personal potential and care, each student will develop and his learning will be visible (Robinson, 2011; Robinson & Aronica, 2015). Yet, the implementation of the organic perspective on education and learning would mean a paradigm shift with important implications for the roles of the teachers, educational aims, curriculum approaches and management of the educational resources and strategies. By taking the responsibility for this changes, school should develop educational tools which would support a more personalized, authentic and relevant learning that involves the learner with all his physical, cognitive, emotional and motivational resources.

As it can be seen above, a major problem that drags on is explaining the mechanisms of learning and then translating them into an efficient school curriculum.

A body in the world

Cognitivism and constructivism have had an important effect on education. However, cognitive psychology is witnessing now a shift in focus: a come-back of embodiment[3]. Even if it is not widely embraced, the embodied cognition approach is pointing to data that shows that cognition is not just about symbols and their manipulation (Barsalou, 2010; Clark, 2011; Glenberg, 2010; Glenberg, Witt & Metcalfe, 2013; Gomila & Calvo, 2008; Ionescu, 2011; Ionescu & Vasc, 2014; Wilson, 2002). More precisely, this post-cognitivist approach reunites cognition with the body and the world[4] and speaks against the view that cognition

[3] Embodied cognition has roots in philosophical traditions like the ones of Merleau-Ponty or Heidegger.

[4] Recently the term *embodied* is used to also refer to the contextual factors that shape cognition, and we will proceed like this too in this paper even if *grounded* might be a better term that includes all relevant components.

refers to higher-order processes that separate themselves from sensory-motor aspects, from the body's affordances and from the affordances of the environment.

If we consider for example language which is a prototype of symbolic processing, recent data show that motor simulations aid language understanding in adults (Glenberg, Sato, Cattaneo, Riggio, Palumbo & Buccino, 2008) and that the body's posture helps children match a heard word with the correct seen object (Morse, Benitez, Belpaeme, Cangelosi & Smith, 2015). Moreover, in the case of mathematics, another paradigmatic case of symbolic thought, studies show that perceptual processes (e.g., spatial proximity) influences adults performance (e.g., algebraic reasoning) (Landy & Golstone, 2007). Advocates of embodied cognition argue today for incorporating bodily elements and the context into how we conceptualize cognition (Smith, 2013).

Although this approach has gathered evidence for deeper links between the body, the context and cognition than previously thought, it cannot explain so far abstract thinking *per se*. There are complex analyses of online and off-line processing, but it is exactly the off-line type of processing that is not understood yet, together with the way we arrive at understanding abstract words, namely those with no apparent link to concrete elements, like friendship or compassion. There are attempts to explain abstract processing (see Gallese & Lakoff, 2005 and Johnson, 2015 for an account for metaphorical understanding, and Barsalou, 2003, 2008 for situated simulation). For instance, the situated simulation account states that representations are not amodal but multimodal: they are simulations of the multimodal states that were active when the brain learned a concept (Barsalou, 2008). Nevertheless, none of the current approaches have succeeded so far in explaining all kinds of abstract reasoning (Barsalou, 2010; Hommel, 2015). However, the question remains: what if knowledge and cognitive operations are fundamentally linked in every moment to the body and the world it navigates?

Embodied learning

One important consequence of the embodied cognition approach may be the understanding of the learning process. If cognitive processes are embodied then using the body and the context during learning should aid knowledge

storage and retrieval and also the constitution of abstract thinking. As such we arrive at the concept of embodied learning.

Recent developmental data supports the idea of embodied learning. For example, in studying language learning researchers discovered that children use posture to map names to objects (Morse et al., 2015). The authors used a humanoid robot model to show that the body-centric spatial location is involved in object name learning: specifically posture binds the multimodal features of names and objects (importantly, names and objects were not encountered together during learning). Tests with infants then showed that indeed body-centric spatial contingency matters for mapping names to objects (Morse et al., 2015). These results point to the fact that learning symbols (i.e., verbal labels denoting object names) is done via the body and its position in space during learning and it is not just some "pure" cognitive process. In another series of studies, Needham and colleagues (Needham, Barrett & Peterman, 2002; Needham & Libertus, 2011) have found that experience with reaching via Velcro-palmed mittens that stick to toys (i.e., motor experience) enhances infants' abilities to independently reach for toys but also to interpret the reaches of other people as goal-directed. Therefore, the authors argue that "learning and cognition are constrained and facilitated by the child's changing motor repertoire" (Needham & Libertus, 2011, p. 119).

In a recent study we showed that language learning in preschool children is facilitated if teachers ground their teaching in the systems children use when learning (Ionescu & Ilie, submitted). 4 to 5-year-olds learned more new words and idioms in the condition in which the teacher involved them while listening to a story by using additional visual, auditory, tactile, and motor cues. This speaks for the role that the sensory-motor systems have for language learning in preschoolers (Ionescu & Ilie, submitted). Older children too seem to use embodiment in learning. James (2010) showed that handwriting experience helps children who learn how to read to better recognize letters because it provides them with a distinct visual-motor program for each letter that facilitates the recognition of written language; this effect was not observed for children who used typewriting.

If cognition is embodied and if embodied learning is more efficient for cognitive development than maybe schools should change their style of teaching to promote this kind of learning in students at all ages (Ionescu, 2014).

Principles of embodied learning as vectors for change in school learning

Principles of embodied learning encourage educators to recognize and explore the complex potential different variables that the learning situations have for supporting students in getting relevant and authentic learning experiences. The focalization on teaching and learning strategies that allow for a multidimensional involvement of students in their own learning is a key for creating school situations that support embodied learning.

The constructivist approaches to school learning emphasized the formative potential of **situated learning models** such as case based learning, project based learning, scenario based learning and of **inquiry based learning** (models focused on developing more authentic and student centered learning situations). These models have in common the fact that they cater for study contexts where the cognitive involvement of students is completed by ways of sensorial, motor and emotional involvement in their own learning, options associated in the research based literature with effective learning (see Hattie, 2014; Marzano, 2015). Moreover these models offer the possibility to provide students multiple ways of accessing the knowledge, by including various "lines of attack" and "entry points" (Gardner, 2014, p. 195) to understanding. The existing research supports learning by doing and by integrating complex new experiences as relevant ways of meaningful learning.

Principles of experiential learning consistently promoted in Romanian preschool and primary school curriculum in the latest years is associated with complete involvement of students in self-generated and self-directed learning according to relevant objectives and through an authentic anchoring into the physical and social elements of the study context. The student has a reasonable amount of control over the nature and direction of learning according to his interests and study needs. The key elements of experiential learning are direct contact with the reality, reflection, and quality of the learning relationships with the teacher and peer students (Paloș, 2012). On the other hand, the learning by doing models of education emphasize alternative ways of getting knowledge that seem to be associated with over passing the disciplinary boundaries and involving students' sensibility and creativity in the process of reality exploration and problem solving.

An interesting and fresh perspective on school learning that could offer valuable reference points for supporting embodied learning comes from the work of Imaginative Education Research Group (IERG) from Simon Fraser University in Canada. Kieran Egan, the coordinator of IERG, developed an educational model focused on the conceptualization of five types of understanding that humans acquire starting with the very early stages of development and up to adulthood, in association with different stages of language use. The stages are suggestively named: somatic understanding (associated with the preverbal level of language use), mythological understanding (associated with verbal language), romantic understanding (connected with written language), philosophical understanding (in relation with capability of using the theoretical language) and ironic understanding (connected with the use of reflexive language).

The passing through the five stages of understanding is not necessarily related with a certain age interval but rather with certain cultural determinations and contexts of "the time and space where children develop" (Egan & Popenici, 2007, p.51). Each type of understanding enriches the person with new capabilities and means for grasping the meanings of the world. In the same time, there is no hierarchy of more or less functional or desirable stages. On the contrary, the new capabilities are more functional if they work together with the previously acquired ones. Each stage remains active and represents a perspective that in itself or together with other types contribute to construction of meanings and knowledge (Egan, 1997; Egan & Popenici, 2007). Each type of understanding is related with a set of cognitive instruments or tools that can enhance the potential of students' minds (Egan, 1997).

At the foundation of Egan's theoretical frame there are two main theories: the theory of cultural recapitulation, that basically supports the idea that traditional cognitive tools the humankind used in cultural history may be recovered and have a potential for supporting the effective understanding, and the socio-cultural theory of Lev Vygotsky. Thus, the cognitive instruments Egan presents have cultural determinations (Egan & Popenici, 2007) and have the potential of involving children in their own learning in a physical, emotional and imaginative way. In Egan's view (Egan, 1997, 2007), tools such as corporal experience, rhythm and rime, gestures and communication offer the very young child the first instruments for grasping the meanings of reality through whole

body involvement in learning. These tools encourage sensory-motor involvement in reality exploration. They are at the bases of the level of understanding associated with verbal communication which are: the story (narrative) with its binary opposites that organize the reality and give children a sense of knowledge unity, metaphors and humor that exhibit the important meanings, mystery and play that emotionally involve children in exploration and situated simulation. The more advanced ages associated with acquiring the command over the written theoretical and reflexive language add to these initial instruments, other sets focused on construction of general understanding and organized knowledge. Cognitive instruments such as: collections, extremes and limits, curiosity, searching for generality and limits of theories, epistemic doubt and reflexivity give the learner that already is capable of a systematic understanding of reality, a sense that knowledge is related with his own physical, cultural and historical perspective (Egan & Popenici, 2007). The use of these tools within educationally guided contexts complexly involves students' imagination as a source for situated simulation learning.

In our view, the theory of imaginative education offers a comprehensive frame for considering the effort of learning as a process that employs a variety of thinking tools through which students become emotionally and creatively involved in and attached with the knowledge. By implementing such tools in the creation of meaningful learning situations, teachers promote a type of school learning that is grounded within the physical, experiential and cultural context of the child.

Concluding remarks

A major aim for future studies is to understand ***how*** the body arrives at abstract thinking. It may be time to change our lenses to include in our studies all the elements embodiment hints to in order to accurately explain cognition in general and learning in particular. The consequence would be a better suited education; a curriculum that supports natural learning and helps individuals to use their endowments in order to optimally adapt to the world.

It does not matter how many curricular changes we make, how much knowledge we put in or take out from handbooks (this kind of change happening a lot in an ever reforming educational system in Romania) but how we teach children that knowledge, namely how we use in teaching the way children learn. In other words, what needs to be changed is the way we shape children's knowledge learning according to how human organisms learn. We need to put cognition back in the whole organism and in its context during learning in schools, and to teach it by not focusing only on it (i.e., cognition for the sake of cognition). We don't mean that at any age we need to literally move our bodies in order to understand and learn. What we do mean is that we need to look at a larger category of factors when we want to make understanding happen: it is not just about cognitive operations, but also about emotional states, past experience to connect with new knowledge, present context in interaction with how the body acts. Moreover, schools should teach children to coordinate what nature endowed them with (Schwartz & Goldstone, 2015).

The embodied approach might serve not only to unify psychology as Glenberg and his colleagues argue (2013), but also to connect psychology to education in a more efficient way by pointing to more accurate mechanisms of the learning humans do as embedded beings in the world (natural learning). With the help of this approach, psychology would understand more about human functioning, education would become more meaningful for individuals, and both would better reach their goal of helping humans adapt to the world. For this end we recommend grounded teaching - a style of teaching that is grounded in all the systems children use when learning (Ionescu & Vasc, 2014).We hope that this opinion article has provoked more questions than answers in the minds of the readers and we invite authors from the related fields to submit future articles that tackle the complex problem of the learning mind-in-the-body-in-the-world.

REFERENCES

Barsalou, L.W. (2003). Situated simulation in the human conceptual system, *Language and Cognitive Processes, 18,* 513–562.

Barsalou, L.W. (2008). Cognitive and Neural Contributions to Understanding the Conceptual System. *Current Directions in Psychological Science, 17,* 91–95.

Barsalou, L. W. (2010). Grounded Cognition: Past, Present, and Future. *Topics in Cognitive Science, 2*, 716-724.

Byrnes, J. P. (2001). *Cognitive development and learning in instructional contexts*. Allyn & Bacon.

Clark, A. (2011). *Supersizing the Mind: Embodiment, Action, and Cognitive Extension*. Oxford University Press, New York.

Cucoș, C. (2014). *Pedagogie. Ediția aIII-a revăzută și adăugită*. Iași: Polirom.

Egan, K. (1997). *The Educated Mind. How cognitive Tools Shape Our Understanding.* Chicago: The University of Chicago Press.

Egan, K. & Popenici, Ș. (2007). *Educația elevilor hiperactivi și cu deficit de atenție.* București: Didactica Press.

Egan, K. (2007). *Predarea ca o poveste. O abordare alternativă a predării și a curriculum-ului în școala primară.* București: Didactica Press.

Engeström, Y. (2014). Învățarea prin expansiune: spre o reconceptualizare a învățării bazate pe teoria activității. in: K. Illeris (ed.), *Teorii contemporane ale învățării. Autori de referință*. București: Editura Trei, p.101-135

Gallese†, V. & Lakoff, G. (2005). The brain's concepts: The role of the sensory-motor system in conceptual knowledge. *Cognitive neuropsychology*, *22*(3-4), 455-479.

Gardner, H. (2014). Abordări multiple ale cunoașterii. in: K. Illeris (ed.), *Teorii contemporane ale învățării. Autori de referință*. București: Editura Trei, p. 192-209

Glenberg, A. M. (2010). Embodiment as a unifying perspective for psychology. *Wiley Interdisciplinary Reviews: Cognitive Science*, 1, 586-596.

Glenberg, A. M., Witt, J. K. & Metcalfe, J. (2013). From the revolution to embodiment: 25 years of cognitive psychology. *Perspectives on Psychological Science, 8*(5), 573-585.

Glenberg, A. M., Sato, M., Cattaneo, L., Riggio, L., Palumbo, D. & Buccino, G. (2008). Processing abstract language modulates motor system activity. *The Quarterly Journal of Experimental Psychology*, *61*(6), 905-919.

Hattie, J. (2014). *Învățarea vizibilă. Ghid pentru profesori.* București: Editura Trei.

Hommel, B. (2015). The theory of event coding (TEC) as embodied-cognition framework. *Front. Psychol.* 6:1318. doi: 10.3389/fpsyg.2015.01318

Ionescu, T. (2011). Abordarea "embodied cognition" si studiul dezvoltării cognitive. *Revista de Psihologie*, *57*, 326-339.

Ionescu, T. (2014). *Copiii altfel: Trasee specifice de dezvoltare cognitivă. O analiză critică.* Presa Universitară Clujeană.

Ionescu, T. & Vasc, D. (2014). Embodied cognition: challenges for psychology and education. *Procedia - Social and Behavioral Sciences, 128,* 275 – 280.

Ionescu, T. & Ilie, A. (submitted). Language learning in preschool children – an embodied learning account. *Early Child Development And Care* (Special Issue: Research on Early Child Development in Romania).

James, K. H. (2010). Sensori-motor experience leads to changes in visual processing in the developing brain. *Developmental science*, *13*(2), 279-288.

Johnson M (2015). Embodied understanding. *Front. Psychol.* 6:875. doi: 10.3389/fpsyg.2015.00875

Landy, D. & Goldstone, R. L. (2007). How abstract is symbolic thought?. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *33*(4), 720-733.

Marzano, R. (2015). *Arta și știința predării. Un cadru cuprinzător pentru o instruire eficientă.* București: Editura Trei.

Morse, A. F., Benitez, V. L., Belpaeme, T., Cangelosi, A. & Smith, L. B. (2015). Posture Affects How Robots and Infants Map Words to Objects. *PloS one*, *10*(3), e0116012.

Needham, A. & Libertus, K. (2011). Embodiment in early development. *Wiley Interdisciplinary Reviews: Cognitive Science*, *2*(1), 117-123.

Needham, A., Barrett, T. & Peterman, K. (2002). A pick-me-up for infants' exploratory skills: Early simulated experiences reaching for objects using 'sticky mittens' enhances young infants' object exploration skills. *Infant Behavior and Development*, *25*(3), 279-295.

Palincsar, A. S. (2005). Social constructivist perspectives on teaching and learning. *An introduction to Vygotsky*, 345-375.

Paloş, R. (2012). *Teorii ale învăţării şi implicaţiile lor educaţionale*. Ed. a II-a. Timişoara: Ed. Universităţii de Vest.

Poole, D. A., Nunez, N. & Warren, A. (2007). *The story of human development*. Pearson/ Prentice Hall.

Robinson, K. (2011). *O lume ieşită din minţi. Revoluţia creativă a educaţiei*. Bucureşti: Publica.

Robinson, K. & Aronica, L. (2015). *Şcoli creative. Revoluţia de la bază a învăţământului*. Bucureşti: Publica.

Schneider, W. (2008). The development of metacognitive knowledge in children and adolescents: Major trends and implications for education. *Mind, Brain, and Education*, *2*(3), 114-121.

Schwartz, D. L. & Goldstone, R. (2015). Learning as Coordination. *Handbook of Educational Psychology*, 61-75.

Skinner, B. F. (2005). *Science and human behavior*. Internet Edition, The B.F. Skinner Foundation (Printed edition: 1953, Simon and Schuster).

Smith, L. B. (2013). It's all connected: Pathways in visual object recognition and early noun learning. *American Psychologist*, *68*(8), 618-629.

Stolz, S. A. (2015). Embodied learning. *Educational Philosophy and Theory*, *47*(5), 474-487.