Implicit learning and content and language integrated learning. Cognitive advantages through multilingual education

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Focus

Our focus lies on Content and Language Integrated Learning (CLIL) in French- and Dutch-speaking Belgium. More specifically, we present the (neuro)cognitive effects of this innovative approach.

Argument

The main argument for cognitive advantages related to multilingual education is that a stimulating environment enhances (neuro)cognitive development. Multilingual education through content and language integrated learning meets all the criteria of a brain-stimulating environment because of the constant interaction between implicit and explicit learning processes. Secondly, learning in a meaningful context lowers the threshold for both content and language learning. Therefore, CLIL is suitable for all types of learners.

When starting early, CLIL takes advantages of children's natural language learning abilities. At a younger age brain plasticity is still at a higher level, which leads to neurostructural advantages (Mohades et al., 2012)[1].

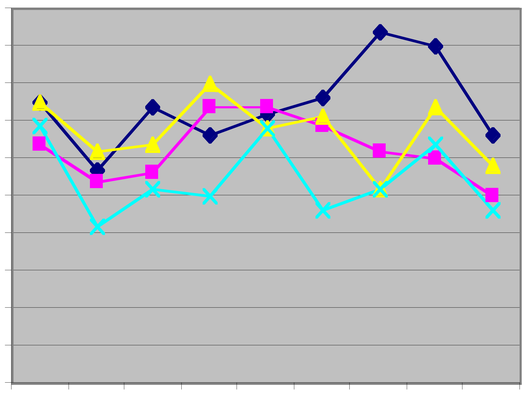
References

1- Mohades et al. (2012): DTI reveals structural differences in white matter tracts between bilingual and monolingual children. *Brain Research,* pp. 72-80.
2- Van de Craen *et al.* (2007): Cognitive development and bilingualism in primary schools: teaching maths in a CLIL-environment' in Marsh,D. & D. Wollf, (2007): *Diverse Contexts-Converging Goals, CLIL in Europe*. pp.185-200. Peter Lang, Frankfurt
3- Costa *et al.* (2008): Bilingualism aids conflict resolution: Evidence from the ANT task. *Cognition,* pp. 59-86.
4- Bialystok, E. & R. Barac (2012). Emerging bilingualism: dissociating advantages for metalinguistic awareness and executive control. *Cognition,* pp. 67-73.

Cognitive effects: maths as a case study

Learning in a CLIL-environment stimulates the develoment of the metalinguistic cognition and the general metacognition: A better understanding of language ensures a better understanding of (abstract) concepts. This would mean that CLIL-students would have an advantage in courses in which abstract concepts are of major importance, like mathematics.

Research[2] has shown that this is indeed true: CLIL-students (*HC, Zon, tReg*) score better on a calibrated math test than their traditionally schooled peers (*Controle*), due to (among others) the better understanding of abstract concepts. It is important to point out that the subject used as CLIL-course was mathematics for the HC-school, whereas the two other CLIL-schools used another subject The mathematical advantage is thus not linked to the subject.



Neurocognition: cognitive control as a case study

Cognitive control or executive functions is an umbrella term for all kind of mental processes that monitor cognitive activity in the brain. Cognitive control is a necessary skill which has been shown to correlate with academic success.

Bilinguals score better on cognitive control tasks tapping into inhibitory skills, even when no linguistic information is involved (Costa et al., 2008)[3]. The reason for this is that bilinguals are better trained in inhibiting the non-target language than monolinguals.

Recent research has shown out that the length of immersion correlates with scores on executive functioning (Bialystok & Barac, 2012)[4]. This highlights the importance of multilingual education for the development of general-purpose cognitive skills in children

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