Abstract

Meeting the challenges and reaping the opportunities for sustainable renovation in science education: empirical data from classroom research and teacher-training

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The integration of language learning into relevant content education (e.g. CLIL) has been shown to not only add *purpose* to foreign language *use* and thus learning, but facilitates content comprehension. Clearly, therefore, we are not talking about "an Italian physics teacher doing his thing in English": if chemistry, history, maths etc. are already intimidating, if not simply boring in L1, "just doing it" in a foreign language would make it deadly. In addition, in a reality where teachers and students are actually sub-fluent in the target foreign language, we are obliged to reconsider *how* and *what* we are teaching. In fact, a "sub-fluent classroom" automatically precludes teacher-fronted lecturing and long readings of long texts (in a foreign language) about an unfamiliar topic. CLIL thus obliges teachers to reconsider what it is their students must know – core concepts of the Content – and then devise ways to help their students attain these concepts, through a foreign language. This naturally re-dimensions Content into more digestible sub-concepts. When we embed these unknown but much more digestible sub-concepts into **tasks** which students can complete through familiar foreign language, we automatically shift our attention away from the *act of teaching* onto the *process of learning*. Methods such as CLIL are therefore triply sensitive to "comprehensible input": is the foreign language comprehensible; is content language comprehensible; is the content chunked into comprehensible units? This talk will show examples of such CLIL learning materials and present classroom research data which clearly demonstrate that CLIL is much more than the sum of its parts. More importantly, when teachers, be they language or content experts, see how *sustained* learning is easily achieved through such learner-centred learning materials, we automatically have sustainable changes in teachers' classroom practice.
Easily accessible references

Easily accessible references

1. Ting, Y.L.T. 2011. CLIL...not only not immersion but also much more than the sum of its parts. ***English Language Teaching Journal***, *65(3): 314-317*
(downloadable from http://cla.unical.it/it/studio-in-autonomia/area-di-studio-clil-iclhe.html) or
(http://eltj.oxfordjournals.org/content/65/3/314.full.pdf?keytype=ref&ijkey=SNZ080WI3PaBhYt)

2. Ting, Y.L.T. 2010. CLIL appeals to how the brain likes its information: examples from CLIL-(Neuro)Science. ***International CLIL Research Journal***, 1 (3):1-18, (In Focus Article). http://www.icrj.eu/13-73

Must reads if you are interested in how ***language*** is at the core of "discipline-literacy" & brain and learning:

- *Language and Literacy in Science Education*, J Wellington & J Osborne, Open University Press, 2010
- Special issue of *Science*, April 23, 2010, *Science, "Language and Literacy"*
- *Teaching Science to English Language Learners*, Rosebery and Warren (Eds), National Science Teachers Association Press, 2008.
- *Writing Science*, Halliday & Martin, 1993.
- *Understanding the Brain: The Birth of a Learning Science,* OECD Publication, 2007.
- *How People Learn: Brain, Mind, Experience and School*, National Academies Press, 2000.

Authors to follow on language and discipline education:

- Catherine Snow (Harvard Graduate School of Education)
- JL Lemke (City University NY)
- E Bialystok (York University)