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Connecting innovation and Geoscience knowledge for Brazilian basic education teachers

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Educational innovation is a pedagogical slogan that conjures up different concepts for the exploitation of new technological resources in schools or elsewhere. Large investments have been made in software and equipment in Brazil during the past several years, but the expected "innovative result" has not been achieved yet. Therefore, it is not sufficient to allocate grants or huge technological resources, because other decisive factors are critical to reach a real innovation. This paper discusses the proposals for supporting in-service teachers of basic education developed as part of the activities of Geo-School project, a research program to connect Geosciences teaching, Educational Innovation and Information & Communication Technologies (ICT's). The research [1] explores a model of innovation derived from the epistemology of the Hungarian philosopher and scientist, M. Polanyi, and the spiral of knowledge – a model which stimulates innovation in organizations – as developed by I. Nonaka and H. Takeuchi. Within this approach, an educational innovation connects two inter-related notions: the learning project with an investigative approach and schools that create knowledge.

The knowledge generated by schools connects a network of relationships that encourages teachers, students and administrators to work together and to develop learning and knowledge structures.

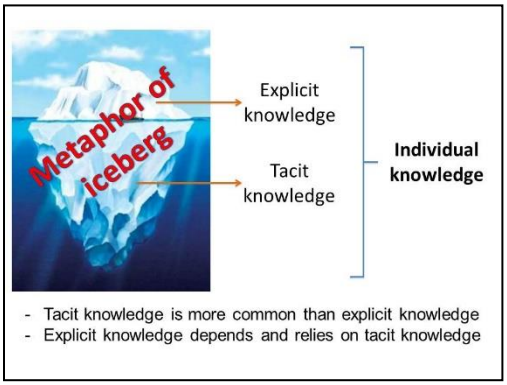

Figure 1. Iceberg metaphor from M. Polanyi [2] and knowledge conversions I. Nonaka & H. Takeuchi [3]

The proposed innovation is supported on theories of meaningful learning, as revisited by: (a) opportunities offered by information and communication technologies (ICT's) in education, (b) singularity of geoscientific reasoning; (c) purposes of science education, and (d) investigative pedagogical approaches to fieldwork in Geology. The insight of innovation comes from teachers themselves, who develop multidisciplinary educational projects relying on geosciences, based on local realities and the interests of the students and the community.

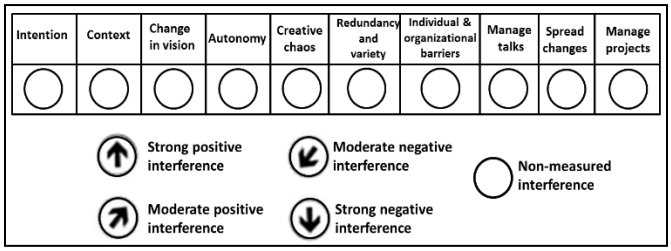

Figure 2. The innovation rule analytical tool.

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As a result, an "innovation ruler" was produced: a useful tool for analysing past educational innovation projects as well as for planning future projects. The ruler considers ten categories of analysis, including

the following parameters: intent, context, change in vision, autonomy, creative chaos, variety, barriers, conversation, dissemination and project management.

References:

[1] Barbosa R. (2013) *Projeto Geo-Escola: Geociências para uma escola inovadora*. Campinas: Geosc. Inst., Univ. Campinas. 105p. URL: http://www.bibliotecadigital.unicamp.br/document/?code=000920387.

[2]. Polanyi M. (1966) *The tacit dimension*. London: Routledge & Kegan.

[3] Nonaka I. &Takeuchi H. (2008) *Gestão do Conhecimento*. Porto Alegre: Bookman Ed.