The GEOTHNK Approach to Spatial Thinking

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Extended Abstract

Spatial thinking uses the properties of space as a means of solving problems, finding answers, and expressing solutions (NRC, 2006). In other words, it uses space for structuring problems, seeking answers, and formulating possible solutions associated with space in science, workplace and everyday life, including the ability to review and analyse space, essential to educated citizens for decision making. The NRC Report marked the need for a major turn in education towards the enhancement of spatial thinking. In Europe, however, there is not a declared official priority yet. In this context, GEOTHNK is a European effort for a scientifically grounded, technologically sustainable framework for the development of learning pathways for enhancing spatial thinking across education sectors and learning environments.

The GEOTHNK approach goes beyond the provision and organization of resources. An innovative learning and teaching environment has been developed[1] for the semantic linkage of geospatial concepts, representation tools, and reasoning processes in between and across domains and educational contexts. To accomplish the project's objectives, the adopted pedagogical methodology follows the Inquiry Based Learning Model as formulated by various researchers and perspectives (such as DeBoer, 1991) and officially promoted to pedagogy for improving science learning in many countries (Rocard et al., 2007).

Spatial thinking is defined as a constructive synthesis of three components: (a) concepts of space, (b) tools of representation, and (c) processes of reasoning. The geospatial domain presents an excellent opportunity towards achieving a meaningful connection between theoretical, higher-

[1] http://portal.opendiscoveryspace.eu/community/geothink-community-400866

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level concepts and tools of representation and their application in everyday life. These components are also helpful in understanding many other georeferrenced phenomena, such as the spatio-temporal change of countries and their boundaries due to historical events.

The set of GEOTHNK concepts is formulated based on a thorough analysis of existing vocabularies, such as TeachSpatial (2011) and Schools Online Thesaurus website – ScOT (2014) and was developed according to the principles of interdisciplinarity, transversality and, semantic linkage. GEOTHNK includes more than 250 concepts, both spatial and non-spatial, concepts referring to tangible objects and abstract notions. Each concept is described by three elements: (a) a term, (b) a definition, and (c) links to useful resources. To support the development of multifarious pathways, GEOTHNK provides links to various categories of representation tools such as maps, map viewers, and map making applications, historical maps, virtual globes, satellite and aerial imagery, tools and resources for exploring and creating visualizations and 2D/3D geometrical models. Finally, reasoning tools are classified into two types; those for: 1) grasping a specific concept and 2) understanding or implementing an educational pathway.

Our experience from the GEOTHNK Community thus far has shown that there is more to spatial thinking than meets the eye; teachers in the community vary in terms of the discipline they practice, constituting a multifarious audience that blends with geography teachers and give strong evidence that spatial thinking cross-cuts the curriculum and should be dealt with accordingly.

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