Towards a Teach the Teachers Programme on the Pedagogical Use of GI Tools

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Abstract

The present contribution focuses on the proposal of a teaching method in order to prepare teachers to integrate the use of GI tools into the standard school curriculum and pedagogy. We refer to all teachers not only the geography teachers: starting from spatial thinking skills – the specific skills we can reach using geoinformation tools with students –, every teacher may obtain pedagogical results both in her/his own discipline and in make students competent in the so called 21th century skills. The method proposed in this contribution is based on the EPICT (European Pedagogical ICT Licence) concept.

1 Introduction

Every teacher has in mind not only her/his disciplinary goals: while teaching specific subject matters, they educate students to the competences needed for personal development as well as for employment and inclusion. As the use of every kind of technology enables students to develop those competences needed to live, learn, and work successfully in an increasingly complex, information-rich and knowledge based society, the use of geoinformation tools seems a good starting point for the development of rich learning scenarios, able to enhance a broad kind of competences. This means to include the geographic point of view in the teaching of other disciplines.

Geography is the discipline focused on the human presence on Earth and on the processes resulting from humans-nature interactions. Across time, such processes influenced and changed the environment and such processes are responsible for the actual shape of the territories we live on. Learning geography and using ICT tools useful for deepen geographical issues, will create citizens who are able to understand and do something about some of the major issues and problems facing the world, including climate change, energy dependence, war and regional conflicts, globalization and international terrorism.

European Parliament and European Council in their recommendation of 18 December 2006 (European Union 2006) decided positively on a "Reference Framework" composed by eight key competences. It identified a number of themes which play a role in all these eight key competences: critical thinking, creativity, initiative, problem solving, risk assessment, decision taking, and constructive management of feeling. A teaching method aiming to teach the teachers to the GI pedagogical value has to bring educators to consider the value of the GI functions useful to develop both the key competencies and them mentioned above. In order to obtain this goal, it is necessary both to make available learning materials focused on the pedagogical value of GI and to make teachers confident in developing innovative learning scenarios with the use of such a tool. This teaching approach leads to the EPICT

Jekel, T, Koller, A., Donert, K. & Vogler, R. (Eds.) (2011): Learning with GI 2011.

(European Pedagogical ICT License) concept focused on the pedagogical use of ICT tools and on the constructivist approach.

2 The EPICT Concept

The EPICT (European Pedagogical ICT License) concept, developed in the framework of the EPICT eContent project in years 2002 – 2005, represents a comprehensive, flexible and efficient in-service training course introducing an international quality standard for the continued professional development of teachers in the pedagogical integration of information, media and communication technologies (ICT) in education. At the end of the project has been formed an international Consortium and EPICT is currently represented in many parts and countries of the world such as Albania, Australia, Austria, Brazil, Denmark, Hungary, Iceland, India Ireland, Italy, Malta, Sri Lanka, and the United Kingdom.

The EPICT approach is characterized by blended learning, team work, flexibility and, pedagogical assignments. EPICT courses make a number of learning materials available for participants that consist of 18 modules: each module focuses on the pedagogical objectives that are possible to reach with a particular ICT technology. In order to acquire competencies in the pedagogical use of ICT, participants – in team – have to develop innovative learning scenarios in which they include the use of ICT. Those scenarios are submitted to a facilitator who gives a quality feedback with advice and ideas on how to make the designed scenarios efficient in real learning contexts. EPICT courses are deployed in eLearning modality: the use of an eLearning platform to manage contents, and of computer mediated communication to communicate in teams and with the facilitator, represents a gymnasium practice of ICT.

3 The Model Proposed

Based on the EPICT concept, we propose a five step model in order to teach the teachers, how to integrate the use of GI tools into the standard school curriculum and pedagogy

3.1 Step one: Key elements and key functions of GI tools

In order to teach the teachers in the pedagogical potential of geoinformation tools, it is necessary to put in clear the main functions of that kind of software. These informations make teachers aware of the activities it is possible to perform in class with their students. It will be necessary to underlay that a geographic information system (GIS) can be regarded as a system that *captures, stores, analyzes, manages, and presents* data that are linked to locations.

The key functions (*query*, *buffering, overlay, analysis of topological relationships*, *spatial interpolation*, *creation of terrain three-dimensional models, localization, models and scenarios construction*, *information representation*), have to be well explained in their pedagogical value in order to make teachers ready to include them in interdisciplinary lessons.

3.2 Step two: Spatial thinking skills and geographical competencies

In a pedagogical approach it is necessary to argue the specific goal of geography at school: enhance spatial thinking skills. At that step it has to be explained the role of *geography:* students with geography learn to manage the spatial coordinates in order to orient themselves both in a natural territory, in an economic system (BISSANTI 1991) or in a conceptual environment: a library, a book, a virtual environment. Geography helps students to learn to observe the world from different perspectives, to critical thinking, to use the scientific method.

3.3 Step three: ICT based learning scenarios and GIS

The data obtained, managed and represented with GIS may be used in dynamic and complex learning scenarios whith a number of different ICT tools: from web communication, to simulation environments, from text editors to spreadsheets, and a number of other ICT tools. Geographic maps become versatile tools able to make possible a participative process. The use of a geoinformation tool asks for the the competence to design, build and manage a database: this means skills in order to perform complex analyses and synthesis, skills in problem solving. GI tools encourage students to be creative when they are asked to represent data; to be critical thinkers when they have to understand the relations between different results; students are helped in remember concepts an themes as they worked hardly on that.

3.4 Step four: Resources for teaching with and about GIS

When teachers are aware of what they can do starting from a geographic point of view, they must be provided with three kinds of resources:

- GIS software (commercial as AgentSheets[1] or open source as 3map[2])
- Lesson plans repositories on the use of GIS, (as http://edcommunity.esri.com/im/index.cfm, or http://www.gis2gps.com/GPS/lessonplans/gpsplans.htm)
- Best practices on the use of GI at school

3.5 Training teachers in developing learning scenarios

Teachers are now ready to develop their own lesson plans. Giving them the right assignments, they will be able to start to think critically about how include GIS in their everyday lessons. It could be supposed to develop three kinds of assignment according to the three approaches to the use of ICT proposed by UNESCO in its ICT Competency Framework for Teachers: *digital literacy approach*, *deepen knowledge approach*, *knowledge creation approach*:

1) GI for geography lessons (UNESCO *Digital literacy approach*)
2) GI to study real world phenomena using communication and collaboration ICT tools (UNESCO *Knowledge deepening approach*)

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[1] http://www.agentsheets.com
[2] http://www.ping.com.au/

3) GI for complex learning scenarios based on ICT based learning communities and aimed to develop the 21th competencies (UNESCO *Knowledge creation approach*)

4 Conclusion and Outlook

Incorporating the use of geoinformation tools in the curriculum enhances spatial thinking skills. This is the starting point for developing rich learning scenarios based on the use of GI tools. It is not necessary to become an expert in the use of such a tool: what is necessary is a training course with materials and learning methods that involve process-oriented learning, problem-based learning, collaborative activities and team-based assessment. When teachers understand the deep and broad value of a technology, they become self-supporting and design efficient (for their teaching context) and original (related to their teaching approach) lesson plans. What we presented in this brief contribution is the first scheme of the model we intend to develop and validate within the EPICT courses worldwide.

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