



Competences and Geography. A meta-cognitive approach

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Abstract

Geography helps knowing, educating, orienting; today it plays an educational role, aimed at developing the knowledge of space in order to observe, analyse and interpret the relationships between environment and human society (Ubertazzi and Forte, 2005a, p. 15). From an educational point of view, it contributes to the development of culture on one side and of the fundamental abilities and skills to achieve personal autonomy on the other. How to describe geographical knowledge from the perspective of constructivism? How to implement a competence-based didactic of geography? This contribution attempts to answer these questions by analysing the idea of competence in terms of pedagogy and didactics, thus examining constructivist didactic models which lead to new interchanges between knowledge, didactics and technology. The role of geography in competence training turns out to be fundamental, as it makes it possible to practice basic space skills, which are necessary to orient oneself in an active and responsible way in the world, and to recognize and face problems at different levels. Lastly, a practical example of competence-based didactics is presented, which proposes the analysis of a geographical region in a dynamic, interactive, laboratorial way; living relevance to meta-cognitive learning, which guides students to acquire: discovery strategy and methods, operational procedures to apply their knowledge, new solutions intuition and invention procedures.

Keywords: Competences, Constructivism, Meaningful Learning, Creative-Thinking, Meta-Cognition

1. Introduction. Educating to competences

«Fatti non foste a viver come bruti, ma per seguir virtute e canoscenza»¹. Dante's Ulysses

¹ Dante Alighieri, Divina Commedia, Inferno canto XXVI: "Be ye unwilling to deny the knowledge, following the sun of the unpeopled world. Consider ye the seed from which ye sprang; Ye were not made

exhorts his fellows not to surrender and be satisfied with what they know, but to go further. The desire to explore and discover is peculiar to human virtue, it is an actual "competence to act" which becomes real in the process of choosing, decision-making and researching, as well as deep understanding.

to live like unto brutes, But for pursuit of virtue and of knowledge".

It is not exclusively about increasing “knowledge”, it is about raising the “knowledge potential” of individuals, which means their ability to know and look for that knowledge useful to solve a problem.

Rousseau, referring to his *Emile*, rephrases this idea with simple, immediate words: «I want to teach him living. Coming from my hands, he [...] will be a man first of all: whatever a man must be, he will be able to be, if need be, like anyone: and as much as fortune may change his condition, he will always stay in his». He wants to teach his pupil to live, to use all the tools he was provided with during his education; a sort of “learning by doing”. This is topical in today’s debate on the competence-based approach.

Competence-based education developed in Europe, and stemmed from the need to validate and equate educational degrees; however, also with reference to pedagogy and didactics, the acquisition of competences is more and more necessary to raise open minds, able to adjust and to innovate.

In his White Paper “Learning: the treasure within” (Delors, 1994), which he drafted as the chairman of a UNESCO international commission of experts (between 1994 and 1996), Jacques Delors highlighted that school should move from ability to competence. The document states that technological progress drives towards the dematerialization of human work, which will be more and more characterised by the quantity and quality of the educational and cognitive elements the individual owns.

Now, what is competence? It can be defined as the set of knowledge, abilities and attitudes which allow an individual to achieve useful results to adjust in meaningful environments and which appears as the ability to face and master the problems of life by cognitive and social skills (Boscolo, 2002, 2012).

Competences generate when deploying in a certain context an orchestration of: declarative and procedural knowledge; cognitive, linguistic, manual, body skills and personal, interpersonal

and social attitudes (Ambel, 2004)². They can be classified as objective, subjective, intersubjective, or as disciplinary and transversal, with reference to rules.

Competence may be understood as the synthesis of four pillars of education: learning to know, learning to do, learning to be, learning to live together (Delors, 1994); conditions shall be created whereby each learning subject can achieve these pillars.

The competence-based approach contributes to developing thinking as it requires the development of cognitive processes, logical schemes, and mental procedures to collect and organize knowledge. As Edward De Bono (2004) states, we cannot teach thoughts but how to think.

The development of competence and thought is strictly connected, if the latter also requires the selection, organization and interpretation of knowledge; however, collecting declarations that support the competence-based approach is not enough, it is also necessary to explore “how”: how to project, how to develop and how to certify competences. The new didactic practices, such as reality tasks or situation-problems, are helpful in this sense (Petracca, 2010, pp. 10-16).

Competence-based education requires a revolution in spaces, times and methods of education, to adjust learning programs and environments to the real world.

The school of competence is propelled by school autonomy³, in which the institution plays a main role in its education, as it is free from the constraints of rules and is appointed to decide, organize and implement its methods, tools and teaching times in a responsible way. The curriculum, therefore, can be adjusted to the students’ educational needs and in line with the professional and cultural evolution of modern society (Crivellari, 2004).

² “Integrated system of abilities, knowledge and attitudes that a subject consciously implements in specific real contexts to reach a target”.

³ School autonomy in Italy was established by art. 21 of Law No. 59 of 1997 and Decree of the President of the Republic No. 275/1999.

2. Knowledge to build

Statements such as “effective learning occurs in real situations”, “competences develop through experience and reflection” recall the constructivist approach, according to which the student is at the core of the educational process, rather than considering the teacher as the sole holder of universal and conceptual knowledge and thus as the focus of the educational method.

According to constructivism, people actively build their knowledge, through social cooperation and interpersonal communication, in close connection with the real situation in which they learn.

Bruner (1990) states that knowledge is “creating meaning”, which means that the subject activates a process of creative interpretation each time he/she wants to understand reality; this implies that students shall be given the opportunity to actively explore, according to their interests and reasons for learning.

Basing itself on these principles, the school should offer real-world learning environments, and education should be provided through authentic tasks, based on cases rather than on pre-established instructions, and should foster reflection and reasoning by building knowledge cooperatively.

Some didactic models come from these principles, among which the most famous are:

- *Learning community*, it is a peculiar environment for cooperative research. Like in any scientific community, each activity is inspired by reflection on knowledge and the sharing of intellectual resources. The environment is seen as a virtual crossroad of proximal development areas with a variety of scaffoldings which support, stimulate, orient in different ways, yet there is space for the subject’s responsibility as he/she is continually oriented towards independence; participants go through different roads and at different speeds, and they keep sharing and mutually exchanging their experiences (Brown, 1994, 1996).
- *Cognitive apprenticeship*, it is a didactic method developed by the American researchers Allan Collins, John Seely Brown and Susan Newman, supporters of the pedagogic theory of social constructivism.

They propose the organization of didactic activities like a traditional apprenticeship, on the model of the so-called “artisan workshop”, competence-based didactics, the “conceptualization of practice” through an approach which focuses on metacognitive aspects and on the different contexts where learning will be applied. An example of cognitive apprenticeship is given by practice communities, learning environments based on sharing, cooperation and mutual aid where knowledge is generated. The social and apprenticeship methods in these environments have further developed through multimedia technologies (Pontecorvo, 2000; Rogoff, 1990; Gagliari et al., 2010).

- *Computer Supported Intentional Learning Environments (C.S.I.L.E)*, it is a psychopedagogic model defined as “Knowledge Building Community”, developed by Bereiter and Scardamalia at the Centre for Applied Cognitive Science at the University of Toronto. In the current era of knowledge, it is fundamental to be able to creatively manipulate knowledge and always generate new knowledge when facing problems in everyday and professional life. Rather than learning for its own sake, this “Knowledge Building”-based approach aims at developing competences which allow people to move and act consciously and creatively, competences which make it possible to effectively use knowledge to solve problems connected to a situation; which implies the ability to recombine one’s own knowledge or to produce new knowledge to face problems (Cacciamani and Giannandrea, 2004). The class is therefore considered as a Knowledge Building Community, engaged into researching new valuable ideas for the community it belongs to. To this purpose, the work of each participant in the community shall be aimed mainly at improving the construction of new ideas to be made available to the community rather than at achieving a good individual performance. Learning is not the ultimate goal of research; it is an intermediate activity which provides the subject with useful understanding and procedures to push the community knowledge. Thus students are actual Knowledge Builders and the teacher is an expert involved in the knowledge building

process (Cacciamani, 2003). Special attention is paid to teachers' training, as they need to be prepared to consider knowledge as being continuously negotiable and transformable rather than static (Ligorio, 2003). In this process, technologies play a fundamental role and Scardamalia and Bereiter have created an online multimedia workspace called CSILE/ Knowledge Forum designed to support progressive and collaborative learning at school making the social and individual processes to create meanings transparent (Varisco, 2002). The workplace is a sort of databank in which students can submit notes (written texts, graphs, images etc.) and organize forums by topics. The system requires using scaffolds, or predefined linguistic structures: the author must use labels for his/her notes so as to guide the note's reading and writing, and to create meta-categories to build the speech. Through such an approach students can be involved in the building of knowledge from the first years of their school education, and become able to participate in complex discussions in several transversal fields at different stages of school education (Ligorio, 2003; Cacciamani and Giannandrea, 2004).

Didactic models inspired by constructivism blend knowledge models, didactic models and new technologies; emphasize the learning environment as a virtual meeting place, where learners play a main role in determining their career and goals.

3. How to promote geographical competences?

Meaningful learning aims at possessing competences. Geography plays a fundamental role in developing those competences, as it allows young students to use space and geocartographic skills, to orient themselves in the world in an active and responsible way, recognising and facing problems at different levels, starting by designing and implementing solutions in their life area (Pasquinelli, 2011, pp. 54-55).

“The development of the national educational standards forced lecturers in geography education to intensely rethink and discuss fundamental

structures of their subject. The focus centres on the question how geographical education should be like in 21st century. In this process system competence turned out to be the basic concept for geographic education” (Rempfler and Uphues, 2011, p. 9).

During the Eugeo 2013 International Congress, the representatives of AIIG, of the European associations Eugeo and Eurogeo and the International Geographical Union (IGU), approved the Declaration on Geographical Education in Europe in Rome, whereby they engage to undertake “initiatives in the countries of Europe and with the relevant European institutions to provide standards and guidelines that will help authorities develop relevant syllabuses and school curricula, methods and approaches in Geography that: apply geographical knowledge, skills and understanding to the main issues linked with processes of change in society, nature and environment at local, national, European and global levels; and highlight the educational values and the role of geographical education in a changing world”.

The Declaration states the purposes of geographical education and warrants those studies and research, theoretical and methodological reflections, and didactic curricula which focus on primary topics such as geographical competences. In order to achieve the above mentioned targets, it is necessary to design new training and refresher courses for teachers, who will be able to teach geography as a living, practical science, necessary for the life of individuals and communities (Giorda, 2013, pp. 155-156).

Linking geography to competences has fundamental meta-cognitive impacts on research (Borkowski and Muthukrishna, 1992), experimentation and innovation (Brooks, 2010, pp. 115-118). First of all it is necessary to revise the discipline epistemology; which means “simplifying” contents by choosing the peculiar units of geographical knowledge.

Gardner (1991) believes that a meaningful learning can only be achieved by focusing on the pillars of the discipline, or on its fundamentals: “I believe school tries to deal with too many subjects thus leading necessarily to a superficial understanding (or non-understanding). It is much more logical to devote most of time to key ideas,

productive ideas and basic issues allowing the students to go deeper into these notions and their related meaning". Also according to Bruner (1986) the goal of education is not broad yet deep knowledge, which can be achieved turning general principles into examples. Again, Perrenoud (1999) states that competences do not turn their back on knowledge, as they cannot do without, but it is necessary to agree to teach less knowledge if competences are really to be developed.

In order to explain the condition of this discipline, Giulio Mezzetti (1979) uses the metaphor of the balloon. When the balloon falls due to a pressure drop, the only way to rise again is to throw off anything unnecessary to travel. Applying this metaphor to geography it would be necessary to delete useless objects and identify the essential, or the specific structure.

The Italian Ministry of Education, University and Research (MIUR) approved the new National Guidelines in 2012, providing disciplinary pillars to build the curriculum and granting total autonomy in the choice of contents; the starting and finishing line are established, and in-between it is up to the teacher, who has to design a disciplinary curriculum with colleagues appropriate to the relevant school context. Among the learning objectives there are four themes to be included in the geographic curriculum: orientation, geo-graphicity language, landscape, region and territorial system.

Once the content has been chosen, it must be made complex, through cognitive dissonances, paradoxes and questions. Research is fundamental, indeed proposing interesting topics for study and in-depth analysis can contribute to creating a positive attitude in students towards geography, especially if they are able to perceive the topics as relevant by making reference to their personal experience and as useful tools to understand issues which they believe important.

As Postman (1996) states, motivation can be stimulated by teaching the history of disciplines; which means explaining the origins of geographical knowledge: its evolution through history, telling about men who made geography, highlighting captivating anecdotes, and so on. This will help students to understand the selection of contents and the relating methods, as Meirieu says (1987) "It is nonsense to teach

and learn how long is the earth diameter, yet how they calculated its length".

Disciplinary integration is also important for geographical competences, and it can be achieved through didactic laboratories and didactic projects.

Generally speaking, project pedagogy is an educational activity which involves students in completing a project having an impact within and outside the school; by way of example: organizing a trip or an excursion, drafting a small tourist guide, preparing an exhibition, designing a website or blog, creating a botanical garden, shooting a didactic video or a photo-reportage etc.

Each of these activities stimulates the students to exploit their knowledge and skills, to coordinate values, attitudes, interests and, above all, creative thinking (Renshaw, 2011, pp. 64-66).

Student-led tasks, with minimal input from the teacher, can promote learner independence and encourage students to become creative geographers (Simmons and Mole, 2014, pp. 66-67).

Through this process, students internalize the working method and are able to use, and re-use it in different contexts.

"The project pedagogy favours the acquisition of complex competences, as students get used to consider the processes they learn at school as tools to achieve the purposes they can understand and which they care for. Furthermore, the tasks to carry out within an extracurricular project are almost always complex tasks. Students do not perceive them as clearly connected to a school discipline. It is difficult for them to activate strategies based on school habits: in fact, they only need to guess how to act, because they immediately link the task to that method, even if they do not really understand it. Through the project pedagogy students become accustomed to interpret new situations using their own resources" (Rey, 2003, pp. 142-143).

The objective of a project-base didactic is not only the acquisition of a coded knowledge, but the internalization of a learning technique, a study method, which makes the subject independent in his/her own learning. This is the way to foster true knowledge which leads to acquiring more knowledge (Papert, 1980).

Geography is significantly moving towards competences: promoting collaborative learning, supporting exploration and discovery, developing practice and reflection, organizing learning into complex and real situations, organizing laboratories.

Geographical learning is built cooperatively, blending the stimulus from the teachers and the curiosity, remarks or difficulties of the students.

Empathy with the discipline is achieved when learning is perceived as an important task to experience and to experience well, which is worthy devoting time to.

“Such considerations highlight how geography can arouse enthusiasm in students of different ages since it helps them to understand the processes and phenomena within their own living space and in places far away. Moreover, geography captivates the imagination and the desire to travel, to get to know new environments and cultures. Appropriate guidelines and teaching strategies, however, are required in order to pursue these aims. Particularly, ‘Knowledge and understanding of the world incorporates a number of aspects of geographical experience and learning’ (Catling, 2006, p. 65). Geography should therefore have an important role in the students’ education because of its specific topics and tools, and also because of its capacity to broach the problems in an interdisciplinary way, which gives input for link-ups with other disciplines” (De Vecchis, Pasquinelli and Pesaresi, 2011, p. 14).

4. From theory to practice

Let us make a practical example of competence-based didactics: “The Japanese archipelago, from paper to reality”.

Locate the position of Japanese territory, remark its wide latitude extension (from 30° to 45° north latitude) and underline that this is the reason for its climate variety. Rainfalls are abundant as it is a marine region and it is exposed to monsoon flows. To conclude, the class might also copy the area of this Japanese region overlapping a tracing paper on the Asian map, and use different nuances to color its three main climate belts: the northern region, with snowfalls and subpolar winters and Siberian cold winds during summer; the central region, with a

mild Mediterranean-like weather, although more rainy; the southern region, with humid subtropical climate, with an average of 2000 mm of rainfall per year and frequent typhoons.

Remember that there is also a difference between the Pacific side, with a hot and sultry climate, and the Asian side, which is influenced by cold, humid air blowing from the continent.

Then move to morphology and use the physical map of an atlas to point out that the country is characterised by several short, raging and irregular rivers. You may also create *questions*, to help to see relations among phenomena, such as: Why are Japanese rivers short and raging? (because of its uneven relief); where do these rivers flow to? (they flow perpendicularly to the mountains and to the coast); why are Japanese rivers irregular? (because rainfalls are not equally distributed due to the monsoons).

A further study might focus on the Japanese economy, with three aspects being underlined: the need for industrial expansion linked to demographic development, the inadequacy of agricultural resources, the role of Japanese trade in the world. Before starting, make an *excursus*, with links and comparisons, on the recent development of the country, which was based on a feudal economy until the mid-nineteenth century, with the emperor at the top of the pyramid including vassals, samurai warriors and, at the lowest level, craftsmen, merchants and peasants. In 1853, the United States ordered Japanese harbours to open to International trade, and the emperor Mutsuhito abolishes castes and starts modernizing the country. After World War II, Japan undergoes an exceptional reconstruction and the flow of huge American capital fosters its industrialization. Today Japan’s balance of trade is very favorable. Activities connected to domestic and foreign trade are concentrated in a few multi-service companies, called *sogo shosha*, which manage all the stages from purchase to transportation. Japan mainly imports raw materials for processing industry, fuels, minerals and food products. Exports instead consist of industrial, chemical and steel products. Once the topic has been introduced, you can involve the class in a laboratory: students will work in groups and draft a *leaflet*

to advertise Japanese products (Ubertazzi and Forte, 2005b, pp. 208-213).

Other in-depth analysis may focus on Japan's urbanization by organizing a cartographic laboratory to examine the three metropolitan areas of Tokyo-Yokohama, Osaka-Kobe-Kyoto, Nagoya; and on education, by comparing the Italian and Japanese school systems. Other laboratory activities can be developed on fashion, customs, music, technology, football⁴ etc.

Each stage of the project shall envisage a multidisciplinary laboratory involving different knowledge (e.g. geography, economics, English, arts, history etc) in order to enrich contents and generate meaningful learning.

The didactic procedure applied for the Japanese archipelago, also uses methods which can be applied to study any territory.

What is extremely important is that in each investigation project, students gain geographical understanding through the observation of the analytical landscape elements and its peculiarities, in order to rebuild regional, national and world pictures. Of course, any merely descriptive presentation should be avoided, highlighting the multiple connections between phenomena, facts and reality, wherever located.

In order to teach to think and act by competences, the method is fundamental, as well as frequent use of practical laboratories, which make it possible to use technical tools (compass, rain gauge etc.), codes to represent data (maps, graphs, diagrams), manual operations (photographs, maps, scale models), geographical reading (the diaries of travellers and explorers, travel writing etc.), different investigation methods (research, interviews, surveys, questionnaires), appropriate aids (film, documentaries, slides, multimedia), network projects with other schools in Italy and abroad, activities outside the school. The following resources promote meta-cognitive learning, so that pupils acquire discovery strategies and methods, learn how to use practically their knowledge, gain intuition and develop new problem-solving procedures (Ubertazzi and Forte, 2005a, p. 18).

5. Conclusions

As discussed, in today's school world, competence-based didactics is becoming increasingly important and has gained such a relevance that ministerial guidelines for teachers are oriented in that direction, especially with reference to the implementation of methodology and didactic strategies.

Sound studies have produced a rich and varied literature, also stimulating a number of in-depth analyses, debates and experimental proposals.

Specifically, this contribution has highlighted the fundamental role of geography in the school focused on competences, as teaching geography by competences "1. Enhances the ability of geography to face real problems of the contemporary world, involving knowledge, tools, methods and disciplinary skills in complex settings. 2. Trains to critical thinking and to assess the territory, places and the relations between humans and the environment from different points of view, projects and intentions, also in a time perspective and considering the consequences of different actions. 3. Develops geographical imagination and creativity (Daniels, 1992; Dematteis, 2004), which are important both to study places taking into account the values, social expectations and perception, and to design changes" (Giorda, 2014, p. 132).

From a meta-cognitive point of view, geographical knowledge offers a range of educational and didactic opportunities providing mental structures which can be easily applied also to other sectors of knowledge.

All these geo-potentials globally lead to re-thinking the ancient static notion-based education and to designing a competence-based teaching/learning which embraces in-depth analysis, reasoning and research, providing students with a deeper critical judgement.

"It is in fact necessary to find innovative contexts of research and to promote laboratory applications where to merge a multiple series of skills to show the true face of geography" (De Vecchis, 2013, p. 6).

⁴ For further reference see: Morri and Pesaresi, 2007.



Figure 1. Students at a meteorology lesson: anemoscope. Photo print (12.9x18 cm) belonging to the Indire photographic heritage. The title is on the rear of the photo: “anemoscope”. Students of the “Iacobucci” Elementary School in Campobasso are at the Vinchiaturo (Campobasso) weather station to study an anemoscope: a device to measure the direction of winds.



Figure 2. Girls at an open-air geography lesson. Photo print (12.6x17.8 cm) belonging to the Indire photographic heritage. The following description is written on the back of the photo “open-air geography: physical and political map of Italy drawn on the floor by students”. Students of the “De Amicis – Ravaschieri” Elementary School in Naples are drawing Italy on the school yard floor for an original lesson of geography.

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