

Geography in Italian schools

(An example of a cross-curricular project using geospatial technologies for a practical contribution to educators)

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Abstract

During the last few years the Italian school system has seen significant changes but geography continues to be considered a boring and un-useful discipline by public institutions. The main problem is the widespread geographic illiteracy and the fact that very often people do not know the objectives, methodology and tools of geographical studies.

In this paper, we provide a framework of the recent modifications concerning geography, recalling the appeal promoted some months ago by the Associazione Italiana Insegnanti di Geografia (AIIG) to avoid a further weakening of the role of geography in senior high schools. We then underline the importance of geography in cross-curricular projects and focus attention on the “*Valorinvilla*” project in order to make a concrete example of an approach which arouses enthusiasm in the students, fulfils interesting purposes and facilitates dialogue with other disciplines. Specifically, the “*Valorinvilla*” project has been created by AIIG for schools of every level and type present in Rome in order to safeguard and enhance the Villa Ada Park, important for its biodiversity and significant historical features. Finally, we show how geospatial technologies, above all virtual globes and world maps, can provide added value both during the preparation phase and during the planning and operational phase of educational projects, generally, and of “*Valorinvilla*” project, particularly. The main aim is to furnish guidelines and a practical contribution to educators and to make geographical research useful, dynamic and pleasant.

Keywords: Teaching of geography, cross-curricular projects, virtual globes/world maps, GIS, geospatial technologies

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Introduction

For the last few years, notably from 2004 onwards, the entire Italian school system has been subjected to a series of far-reaching changes that have led to new arrangements and new teaching policies. These changes to the system were instigated by the Ministry of Education, Universities and Research as part of its provision of coherent guidelines for the structure and organisation of the Italian school system. Until several decades ago, the Ministry would issue “ministerial syllabuses” which amounted to an inventory of subjects that had to be continually updated; when this updating often did not take place, as was the case in the senior high school, the result was excessive delays and widespread malfunctioning. The need for continuous updating was due mainly to two factors: the first concerned theories of knowledge, and the second, more generic, factor was a result of social and cultural changes (and thus intrinsic to each society). Periodical renewal of syllabuses, therefore, allows for new research findings to be transferred to teaching, as well as providing a response to social changes and progressively emerging demands (Griffiths, 2010).

From Syllabuses to Guidelines: Primary education

The syllabuses for primary schools, introduced in 1985, were a sure sign of the interest in innovation prevailing at the time and were revolutionary in that they replaced a system based on inventories of subjects, and thus dependent on content, with an on-going schedule of educational activity projects. Today, with the emphasis definitively shifted from teacher-centred to learner-centred instruction, the inflexibility of the old “Syllabus” has been transformed into the more tractable “*National Guidelines*”, which allow for more appropriate personalisation and more attention paid to the learner’s educational needs. The *Guidelines* are identical on a national scale for all students at the same level and in the same type of school, and are implemented on a local scale. The teacher no longer has a function based on class management and rote-learning, but takes on a creative, knowledge-based role which is more complex but certainly more satisfying.

The new *Guidelines for the Curriculum* (dated 2007, but undergoing further changes) serve as a reference point of departure for teaching geography in schools (Ministero della Pubblica Istruzione, 2007). As an academic subject, geography suffers from a prejudice which is prevalent and difficult to eradicate: that of being boring, descriptive and encyclopaedic, made up mainly of concepts, numbers and place-names that have to be memorized and located on maps. This widespread impression starts in the very first years at school and becomes more universal as time goes on, tarnishing the subject’s image and making it unattractive and misunderstood.

The *Guidelines* can play a decisive role in shedding light on the essential nature of geography as an academic subject, even if the designing of the teaching of it is the task of school directors and the teachers themselves. The *Guidelines*, however, put forward

a framework for establishing geography as an active discipline, with a significant, if not to say irreplaceable, presence in the curriculum. The last sentence of its presentation of the subject is striking in this regard:

Doing geography at school means producing citizens of the world who are aware, independent, responsible and critical, who know how to live within their environment and how to make creative and sustainable changes to it, with an eye to the future (Ministero della Pubblica Istruzione, 2007, p. 87).

These primary educational objectives are found in the definition of the discipline, as a science that studies “the humanization of planet Earth”, in other words, how societies over time have shaped terrestrial space. Hence geography’s major specific aim is to provide keys to reading and interpreting the territorial environment in its increasing complexity and rapid transformations.

Nevertheless, whenever it is claimed that children “don’t know geography”, this does not refer to their lack of keys to interpret the territorial environment, but to the fact that they do not know where to find a city, a state, a lake or a mountain, even if these are well known. We are back to the usual prejudice on the nature of the discipline: geography is essentially descriptive, all about seas and mountains. We must decisively affirm that this kind of geography lacks the educational purposes necessary to justify its presence on a school curriculum! Fortunately the *Guidelines* set out approaches that concentrate on the evolution of the discipline, without neglecting, even so, the need for a basic knowledge, when they include among the aims of skills development the pupil’s ability to know and locate the main physical and human geographical “objects” of Italy (in primary school) and of Europe and the world (in junior high school).

Mind maps and geo-graphic language

Without reference points in our minds we are unable to orient ourselves, we get lost, unless we move according to our personal information bank, which is located and positioned, both absolutely and relatively, in space. If we possess secure mind maps that are as accurate as possible, we will not find ourselves alienated in space, at whatever scale, from our immediate environment up to the world at large. The construction of mind maps is a continually evolving process that starts in infancy; we use them to acquire information on the position, qualities and nature of an object, a fact or a phenomenon (De Vecchis, Staluppi, 2007, p. 137-138). Thanks to our internal map, for example, of our neighbourhood, we can “reconstruct” it, observing it from many different viewpoints, mentally travelling through it and judging what changes could be made to it. At the end of their primary education, students should possess a mind map of Italy that is as detailed as possible, and be able to place it within areas and contexts that are progressively more wide-ranging, up to the level of the whole world, when they reach the end of their first stage of education.

Among the topic units of the *Guidelines* for geography (in the *Learning Objectives* for both primary and junior high schools) are such “mind maps”, such as the important unit “Geo-graphic language” (one of the strong points of the discipline), which involves a series of activities, such as reading and interpreting geographical and thematic maps, photographs, diagrams and graphs, judging directions, distances and dimensions, using coordinates, hand-drawing sketches and using a computer. All these operations help to enrich our mind maps, since geo-graphics improves our spatial orientation and our geographical imagination. The study of geography should include, right from the start, the constant use of maps, to activate students’ visual memory and facilitate the memorisation of, and ability to locate, various objects.

The *Guidelines* also refer to the latest technological advances in the field of geographicity, such the use of new devices of spatial representation like satellite imaging and computerised cartography. These tools and methodologies can open up new vistas in the teaching of geography, and instil curiosity and an appetite for exploration in the students. Google Earth, for example, is a teaching aid with enormous potential for combining direct and indirect observations. Without leaving the classroom, the students can go on virtual journeys, visiting vast cities or small villages, or even visit everyday environments, including their own homes. These virtual journeys make it possible to acquire new important geographical information and encourage interdisciplinary discussions (Helmer, Bloch, 2010).

Geographical scales, environmental protection and relationships with others

The *Guidelines* establish a greater continuity in teaching from primary school to junior high school. Instead of the old cyclic method, where the same topics were revisited in ever more detail, teaching is progressive, with the emphasis in the primary school on the space surrounding us and the geography of Italy, moving on to European and global geography in the junior high school.

There is a significant obstacle to effective learning when little consideration is given to changes of scale, allowing comparisons to be made between what is close by and what is distant, an essential skill if we are to interpret the world around us. The *Guidelines* encourage a continuous correlation between the largest scale (what is close by) and progressively smaller scales (up to planetary level). In the *Guidelines*’ presentation this concept of changing scales is explicit, when it states that:

From primary school upwards, [pupils] should become accustomed to analysing each element within its spatial context, starting with the local environment and eventually reaching a global dimension. By constantly comparing spaces that are read and interpreted at various scales, students can contrast reality at a local and a global scale, and vice versa (Ministero della Pubblica Istruzione, 2007, p. 86).

Teachers have the sensitive task of transmitting the knowledge that is specific to their own discipline, yet to obtain unequivocal results, they must incorporate the basic precepts of other disciplines. In geography, the educational task of the teacher involves developing an interpretation of the territory represented at different scales and a cognizance of the relationships between human societies and the environment. These are complex issues, replete with significance and valuable for a discussion on major problems of contemporary society: the protection of the environment, the human-nature relationship, social development and the differences between cultures.

These issues should be carefully taken into consideration by teachers when devising curricula, recognising the potential offered by the teaching of geography, especially its examination of the vital link between culture and environment (Earl, Montalvo, Ross, Hefty, 2008). The *Guidelines* draw attention to the defence of the natural world, and assign to geography a crucial role in the teaching of environmental studies. Relationships with others (teaching inter-cultural issues) are certainly among the major concerns that schools have an important responsibility to teach to their pupils. "Training students to observe reality from different points of view", and accordingly to rise above a self-centred sense of space, to find relations in particular interpretative observations and increase the number of perspectives with which to comprehend the world; this should be the primary objective of geography teaching. Geography in fact studies cultures, above all from the point of view of their ability to make an impression on a territory by means of a specific series of signs, with the territory subsequently exemplifying the values of that culture. The objective is plainly stated in the aims of skills development at the end of the first stage of junior high school: *Students are able to open their minds to relations with others, through knowledge of different environmental, social and cultural contexts, and by overcoming stereotypes and prejudices* (Ministero della Pubblica Istruzione, 2007, p. 89).

Inter-disciplinary studies

The grouping of disciplines into areas, as set out in the *Guidelines*, already points in the correct direction. Linking geography in the same sector with history opens the way to a major interaction between disciplines. One must remember that time is an essential factor in geography, which is a chrono-spatial discipline; any consideration of space would be incomplete if it meant interpreting it as a static physical surface, a mere background for the activities of a society. The time dimension introduces into geographical space the idea of evolution and change, and understanding time helps the student to better interpret his environment, which is subject to ever-increasing rapid transformations, by coordinating both dimensions at different scales – from changes in his own life to changes in his local community, in his country and in the world at large. Exploring space through time involves the past history of mankind, and also its future – short or long term – and above all allows a student to acquire a sense of responsibility, in that the effects of choices made in the present impinge upon events in the future.

There should be inter-disciplinary contact between all academic subjects; geography in this regard can be seen as a driving force which in association with other disciplines can give rise to a large number of didactic initiatives. A special feature of geography is its capacity to identify and interpret processes, signs and phenomena that arise from the human management of our planet, to develop lines of reasoning that incorporate sets of topics and contents, and to bring together various themes belonging to both the human domain and the natural environment.

The inter-disciplinary nature of geography comes to the fore in its treatment of the theme of landscape, which has a long and estimable history in teaching and research and which has been subject to many different interpretations. In the *Guidelines* the topic of “landscape” is given due significance, both in the primary and junior high school syllabus, and the inter-disciplinary aspect of the topic is highlighted, when it affirms that the student “*recognises in landscape the important physical elements and also the historical, artistic and architectural developments that make up a natural and cultural heritage that should be enhanced and safeguarded*” (Ministero della Pubblica Istruzione, 2007, p. 89).

Senior high school

The primary and junior high school system (pupils from 6 to 13 years) has undergone many changes since the Second World War, while secondary education, on the other hand, has remained forcibly unchanged after decades of delays and postponements. During this considerable length of time hundreds of experiments have been proposed to attempt to narrow the gap between school and society, but their fragmentary nature made them inadequate as ways of delivering a satisfactory and coherent educational structure for children in this age-group.

We have obviously now arrived at a watershed moment where long-awaited and often-adjourned reforms are being implemented. For economic reasons, sizeable cuts were made in the hours of lessons taught. Teachers of geography, which had already been considered as a second-class subject during the experimental period, hoped the reforms would improve its standing, but unfortunately their hopes were dashed and geography teaching suffered a further reduction in status. It has disappeared from the curriculum of all technology-oriented Technical and Professional Institutes, and has also been subject to a worrying retrenchment in grammar schools, where in the first two years it is taught alongside ancient history; both subjects together have been assigned a timetable of three hours a week, compared with the four (two hours each) they previously had. After the first two years, the picture is unchanged, but without any geography at all.

The complete absence of geography as a subject in the senior high school deprives students of indispensable areas of knowledge, including many of major importance, such as environmental, social, economic, political and cultural topics connected to

globalisation. Consequently, a great number of students are denied the basic tools for understanding what is happening in the world, or the tools are seen as peripheral and ineffectual because of the cuts in the hours dedicated to them. That is not all, however; since the study of Italian geography takes place only in primary school, students leave school with the geographical knowledge of 10 to 11-year-olds! In Technical Institutes geography is taught in the economic curriculum, but not at all in the technological curriculum, where it was in many cases a traditional subject. Only in the tourism curriculum can it be said to enjoy a high status.

The reduction in the first two years of grammar school has met with a strong reaction on the part of the Associazione Italiana Insegnanti di Geografia (AIIG) who issued an appeal for the retention of the subject, which was endorsed by all the other geographical associations. Here is the short text of the appeal, entitled *School without geography*:

Doing geography at school means producing citizens of Italy and the world who are aware, independent, responsible and critical, who know how to live within their environment and how to make creative and sustainable changes to it, with an eye to the future. In the new curricula envisaged for grammar schools and technical and professional institutes, geography will either entirely disappear or be drastically reduced. The undersigned believe that denying students the knowledge tools supplied by geography, in an increasingly globalised and complex social environment, means depriving them of knowledge that is absolutely indispensable for them to meet the challenges of the modern world (www.aiig.it; De Vecchis, 2011, p. 14).

Within a month, the appeal, published online, had received thirty thousand signatures, including many university rectors and deans, teachers and cultural spokesmen, journalists and major associations. Yet the surprising result was the enormous interest the appeal aroused in the public at large, which indicated how much ordinary people were aware of the importance of geography in school. Even though the appeal failed to effect changes in the school timetables, it had nevertheless had conspicuous and unexpected effects on public opinion, the mass media and politics, judging by the quantity as well as the content of the response (De Vecchis, 2011).

There were positive effects also at a ministerial level. For example, in the *Guidelines for the transition to the new system* (for Technical and Professional Institutes), paragraph 2.2.3 (*Knowledge of the territory and the environment*) has as its first sentences:

Results of learning in the cultural, educational and professional fields contain explicit references to geographical knowledge. Geography, in fact, since it is a science which studies processes, signs and

phenomena that derive from the human exploitation of the planet, develops skills which are useful in the field of general education as well as in their specific area of competence. The teaching of geography, treating as it does topics belonging to the human domain as well as to the natural world, can be considered to be, simultaneously or alternatively, 'humanistic' and 'scientific'. Geography can be seen as a bridge or a meeting-point between different areas of knowledge, and as a reference map for acquiring linguistic, historical, economic, social and technological skills (Ministero dell'Istruzione, dell'Università e della Ricerca, 2010).

The above cannot be held to be a recognition that the presence of a teacher of geography as a distinct discipline might imply. Yet it is evidence of the educational role that the school system attributes to geography and one that teachers could extend by including geographical knowledge in their course programmes.

In grammar school, as we saw, the major novelty is in the fusion of history and geography. This is an innovation that could be of major interest, and which has a long history in other countries (e.g. France). The two disciplines, by developing approaches in both space and time, are effective ways of arranging knowledge to give order and significance to information that we receive from our perceptions and our experience. In Italy, an effective system of convergent disciplines is not without its problems; but an interesting precedent, directed towards a fruitful integration of disciplines, can be seen in the work carried out, following the proposals contained in the *Guidelines* for the primary education, by a commission of history and geography teachers who managed to collaborate effectively. Unfortunately, however, the coupling of history with geography has not got off to a good start; above all because the reduction in hours has seriously compromised the teaching of basics, but also because of the interruption after the first two years, which precludes any close linking of geography with modern and contemporary history or any examination of the mutual connections between them. Only among the aims of history teaching in the last year of grammar school do we read that "*certain topics of the contemporary world can be examined by taking into account their 'geographical' nature (for example, the distribution of natural and energy resources, the dynamics of migration, the demographic features of different areas of the world, or the relation between climate and economics*" (Ministero dell'Istruzione, dell'Università e della Ricerca, 2010).

This seems to be woefully insufficient, and in any cases displays a decided bias on the part of history; any marriage between the two academic subjects should start from a position of equality, without any risky subordination of one to the other. To avoid any misunderstanding, we should point out that it is not in any way a case of wanting to create a space for geography to the detriment of history, but of developing a common programme without any subservience of either discipline that could negatively affect its effectiveness.

What is written in the educational profile of the student, which serves as a preface to the *Guidelines*, cannot be regarded as satisfactory either, if the purpose is to establish a coherent programme. Among the educational aims common to all grammar school syllabuses we find the study of geography, which is held to belong to the historical-humanistic area. There are continual references to the discipline, of which two are as follows:

- Knowledge of the history of Italy within a European and international context, from ancient times to the present day, with reference to events, geographical contexts and major historical personages;
- The use of methods (spatial perspective, relations between man and the environment, regional studies), concepts (territory, region, location, scale, distribution in space, mobility, relationship, sense of place...) and tools (geographical maps, geographical information systems, images, statistic data, sources) of geography in order to interpret historical processes and analyse contemporary society. On the other hand, similar arguments are confirmed by international literature (Trites, 2008).

There has to be a single process followed in the training of teachers who are to deal with these two combined disciplines, perhaps also with the addition of philosophy (Kant was not only a great philosopher, but also a university teacher of geography!). This affects the training courses and open examinations for teachers, with a need for a sufficient number of assigned credits. This kind of teacher training lies still in the future; we hope that positive steps are taken in this field, not only for the sake of the future of geography and history, but also with a view to the future of the school and the next generation.

In the meantime, a renewed and attracting image of geography has to be widespread from primary to senior high school. In order to reach this aim, new methods and tools have to be tested and used. Thus, cross-curricular projects and geospatial technologies can represent key elements to be able to show the usefulness and originality of geographical studies in a coherent process which is finalised to underline the importance of geography for personal culture and for human life.

Geography in cross-curricular projects: the “Valorinvilla” project

The Associazione Italiana Insegnanti di Geografia has for many years now promoting a different kind of geography teaching, aimed at understanding the complexity of modern life; in schools, this geography carries on a productive dialogue with all the other disciplines and becomes the pivot of cross-curricular projects, which appeal to the students and help them obtain extremely important educational results.

During the International Year of Bio-diversity, the Rome branch of the Associazione Italiana Insegnanti di Geografia, in collaboration with the Department of documentary, linguistic, philological and geographical sciences of the Sapienza

University of Rome, created a cultural educational project formed around a real “bio-diversity laboratory” – the Villa Ada park in Rome. The park, in fact, is included among the list of sites drawn up by the Ministry of the Environment for the Bioitaly programme (Biotopes Inventory of Italy). The park is also important from an artistic and landscape viewpoint (its eighteenth century landscaped garden and nineteenth century Romantic garden) and from an archaeological standpoint (under the park there are extensive underground cemeteries such as the catacombs of Priscilla, which contains unique relics of early Christian worship).

The project aims to help children and teenagers get to know the Villa Ada park in many of its various aspects, and for them to draw up “environmental and territorial itineraries” for their classmates, with a view to enhancing their awareness of the priceless natural and cultural heritage preserved in the park. The *Valori-in-Villa* (Treasures of the Villa) are not only those that we can observe with our eyes, but above all those that the knowledge and study of geography can provide us with: respect for and protection of the natural environment and buildings, the ability to appreciate the significance of a communal asset, leaving it untouched and improved for future generations. The project was open to school pupils at all levels: nursery, primary, junior and senior high school. A series of seminars was organised at the Sapienza University for the teachers who would be guiding the children, in which various experts (botanists, archaeologists, geographers who were experts in GIS, virtual globes and world maps) gave out information and materials to use with the students in school.

The skills development aims and the method

The main educational objective is that of creating awareness in the pupils concerned, and in their schoolmates, of the conservation and development of a territory that is part of their lives, through knowledge of its bio-diversity and its geo-morphological, geological, botanical, archaeological, artistic and social aspects. During the project, the pupils have the opportunity to develop certain important skills, at levels appropriate to their age group: they have to identify, by direct observation, the natural and man-made phenomena that have influenced the form of this piece of urban landscape (Pasquinelli d’Allegra, 2006); they should learn how to use different types of sources (geographic and thematic maps, satellite images, virtual globes and world maps, historical, artistic and archaeological evidence, old photographs, documents, and so on) so that they can gain a knowledge of the territory in geographical, environmental, historical, artistic and social terms; they should also learn how to evaluate the resources present and pass this knowledge on to their schoolmates.

The project uses a research-action method (Barbier, 1977, 2007; Elliot, Giordan, Scurati, 1993), which enables the students to pass from the research stage proper (with the application of the scientific method) to the second stage, where the research results are applied to an activity; in this case, designing the sections of an itinerary inside the

park or in the neighbourhood to be followed by their classmates. The itinerary illustrates the aspects that have aroused most interest and captured their imagination during their guided visits to the park. In this way, the children and teenagers involved have to be able to awaken the same interest in their classmates, and the same behaviour based on respect for and conservation of the natural and cultural heritage of the park. Finally the pupils are invited to think about the project and assess the effectiveness of their work on it; this reflective stage is also gone through by the teachers themselves, who have an opportunity to judge the educational productiveness of the project and the teaching and learning activities adopted within it (Pasquinelli d'Allegra, 2009).

The results of the project will be made public in an exhibition held inside Villa Ada, showing the illustrative materials produced by the students, and the award of a prize to the most original itineraries. The project is significant also for its use of new technology (something of great importance for geography teaching in today's schools), especially for visualising aerial views in orthogonal perspective and using 3D to create original results in a learning environment that is dynamic and stimulating for the students.

Geography and geospatial technologies: some theoretical reflections

Geography is a fantastic subject, encouraging us to explore and understand the world around us. It gives students the opportunity to encounter places and environments locally and globally, to combine a range of skills in fieldwork and classroom study, and to identify links between aspects of the natural and human environment that other subjects often study in isolation (Knight, 2007, p. 57).

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.

For example, geography:

- *Uses enquiry at a range of scales to provoke and investigate questions about natural and social environments and their interactions;*
- *Develops skills in problem solving, fieldwork and mapping;*
- *Examines and considers ways to resolve issues about the environment and sustainable development;*

- *Engages children in thinking about their own place in the world and their personal values; and,*
- *Encourages children to consider their rights and responsibilities in relation to others and to the environment (Catling, 2003, p. 167).*

During the time, geography has become increasingly dynamic and relevant to current problems, and has developed different interesting methods to investigate and represent phenomena, elaborate data and analyse problems, thanks to a number strictly related tools, as for example, statistics, graphs, thematic cartography, Geographical Information Systems (GIS) and remote sensing, Unfortunately:

Extremely often, however, these aspects are unknown to both the public at large and to policy-makers, who perceive geography as a static, notional academic subject having limited social usefulness. The consequences are thus an obvious and more or less widespread geographical illiteracy, which is far removed from the real world of geographical researches. People's ideas are stuck in the past, in images of a subject based on memorisations and descriptions, which is no longer the case, and they continue to regard geography as a second-rate (or even maybe third-rate) subject, a mere collector of names, unnecessary facts and artificially connected concepts (Pesaresi, 2011, p. 135).

Some kind of organic extensive project, therefore, needs to be created to awaken the Italian political world and to show everyone the effective and practical potential of geographical research. From a teaching point of view, geography can provide important values concerning human and sustainable development, ecological sustainability, the preservation of natural and historical resources, active civic responsibility, and respect for other cultures and for immigrants. As regards applicative skills, geography can, for example, provide methodologies and tools to examine the evolution of land use and urbanization, to evaluate the main risks to humans of geodynamical events, to analyse social-demographic and economic problems at various scales, and to simulate possible scenarios using local features in space and time.

Nowadays, geography can profitably avail itself of a quantity of tools as a practical support for theoretical competences, but at the same time, technical and the teaching skills must be developed which are necessary to maximize the potential benefits; these skills will then provide a basis for innovative researches and useful applications.

GIS can be said to be the tool of preference in senior high schools, in universities, at a post-graduate level, with which more advanced detailed research can be carried out, with concrete and socially useful results, whereas it appears that virtual globes (Google Earth) and world maps (Google Maps, Bing) are user-friendly and open source tools and are the most efficient geospatial technology that can be used with students in primary school and junior high school. In addition, especially if combined with classic

cartography and photos, they provide important input for observing and understanding phenomena and the changes that have occurred (Bodzin, Cirucci, 2009). Moreover, virtual globes and world maps open students' minds to a new way of looking at geographical features and they can be used to prepare them for the successive passage towards Geographical Information Systems, which can be seen as a tool serving the need for a general and more modern geographic literacy.

Educationally speaking, virtual globes and world maps can be defined "the most powerful and useful visualization tools ever created" (Schultz et al., 2008, p. 30). In fact, the use of these geographical education tools allows students to:

- *Become familiar with interpreting aerial, remotely sensed image data by answering questions included in the lesson plan, including considering special trends and patterns;*
- *Identify geographically significant features and consider their importance, as well as the impact of development on them as unique resources; and*
- *Consider how the earth has changed over time and how external threats and forces have contributed to such change (Patterson, 2007, p. 151).*

In short, these tools allow students to (Pesaresi, 2007):

- Simulate the lesson in the field, "bringing the places into the classroom";
- "Retrace", on returning to the class, the journey followed and fix some focal points;
- Enrich their mental maps of their living space and virtually explore far away and inaccessible places;
- Make general and detailed observations on physical, human and cultural aspects and elements, thanks to the possibilities of changing zoom, perspective and orientation;
- Overcome the problems of availability, high expenses and long time periods in obtaining these kinds of images;
- Back up quantitative data with images which show the features of the different places;
- Operate in an interdisciplinary way.

In order to facilitate the passage towards GIS, AIIG and ESRI Italia have recently produced an application programme open source named "*L'Italia attraverso le carte tematiche*" (<http://www.aiig.it/>; <http://www.esriitalia.it/>), supported by many specific comments which can be useful as guidelines (Pesaresi, 2010). A synthesis of the teaching and educational potential of this application programme, designed above all for the students of junior high school, was presented during the "ESRI EMEA User Conference" (Rome, 26-28 October 2010) in the poster section, where the main aims can be summarised as follows:

- (a) *to point students towards new teaching methods;*

- (b) to promote a general geographical literacy, also on the basis of new information technology and digital cartography;
- (c) to provide students with interesting tools and professional skills;
- (d) to spread a new image of geography (Pesaresi, Marta, 2010).

The integrated use of virtual globes and world maps with GIS and intuitive application programmes, specifically created for educational purposes, can “facilitate learning through the five skills sets (asking geographic questions; acquiring geographic information; organizing geographic information; analyzing geographic information; and answering geographic questions)” typical of geography (Schultz et al., 2008, pp. 32-33). Also, the training courses financially supported and sponsored by the Italian Ministry of Education and Regional School Boards are indispensable for teachers, whose main task is to lead their students towards the geographical discovery of the world.

Geospatial technologies in the “Valorinvilla” project

After the productive educational experience (during the scholastic year 2007-2008) which we had with the project “*Segni e Sogni in Città*” (De Vecchis et al., 2008), created by the Rome and Lazio branches of AIIG and by the Geography Unit of Rome Sapienza University, in collaboration with the *Assessorato alle Politiche di Promozione della Famiglia e dell’Infanzia* of Rome City Council, we have re-proposed the use of virtual globes and world maps as the main geo-technologies that can achieve important geographic and applicative results with primary and junior high school students.

Thus, in the first phase of the project “*Valorinvilla*”, we showed the benefits which may be obtained with Google Earth, Google Maps and Bing (Microsoft). During a couple of lessons and presentations with the teachers of the schools participating to the project, we demonstrated the different functions and main features of these tools, because it is important to use them simultaneously. At the same time, we focused attention on the educational aspects and on the teaching purposes which can be obtained. In fact, the technical aspects are important but they have to be a function of the teaching aspects.

After considering these aspects and showing several examples, we underlined the possible applications for study in the context of Villa Ada which has important historical features and which is an interesting biodiversity laboratory *in situ* and *ex situ*. These elements have to be analysed in the field and using virtual globes and world maps, given that these technological tools can show synthetic views, useful for general frameworks, and several details regarding trees and plants, lakes, routes, cultural resources, etc., by changing the zoom.

First of all, the use of Google Earth, Google Maps and Bing is useful for defining and observing the boundaries of Villa Ada, the principal roads which delimit it and

allow access (Fig. 1). Moreover, a general view lets us know the amount of urbanization and the density of housing, the main structures and infrastructures of the nearby area (e.g. the Acqua Acetosa Sports Centre) and the presence of relevant geomorphologic and geographic elements (e.g. the meandering course of the river Tiber in the north and west sectors). The possibility offered by Google Earth and Google Maps, which allow us to open windows with photos and historical information, provides further means to better understand the area under study. Another very important added value is the function "Street View" which simulates a real survey *de visu* and usually captures the attention of students.

Then, in order to have an idea of the modifications recorded over time, the use of the Google Earth's function which shows historical images is very important, also because in the case of Villa Ada we can ask the system to load one view taken in 1943. The comparison between the present image and the old one shows significant changes, as for example (Fig. 2-3):

- *In 1943 pasture and arable lands were more visible (some of these areas, today, are substituted by trees);*
- *In 1943 the Acqua Acetosa Sports Centre which now lies outside the north-west sector of Villa Ada was not present;*
- *In 1943 the north-east sector outside Villa Ada did not show the same amount of built-up areas.*

From a practical point of view, we can fully understand the importance of this function if we think that until some years ago it would be very difficult at school (if not impossible!) to have these kinds of images perfectly comparable with recent ones; a long time and/or high expenses would have been necessary. In addition, we should remember the importance of Bing; in fact, it is the tool which often allows us to have the most interesting images in 3D (Fig. 4-6). In this case we can observe images in very high resolution: we seem to fly over the study area aboard a hot-air balloon. The images are so clear that we can discern a lot of important details which could lead to interdisciplinary research alongside history and art history.

In the planning phase (Fig. 7), presently in progress, the virtual globes and world maps can provide fundamental operational input. In fact, in Google Earth, the button indicated with a ruler allows one to measure the distances between objects and the length of possible routes which students want to define. In this last case, students can work by fixing some focal points directly on the image. For example, by using the appropriate button, they can insert a symbol to point to a particular element or to underline what they would like to be there. In fact, different symbols can be used according to needs.

Google Earth also gives students the possibility to record films. This function can be useful, once back in school, for recording and remembering the route followed during the study in the field. Also, it can be useful to record the environmental and

territorial itineraries proposed by the students. Thanks to the combined use of the virtual globes and world maps, “*the children can experiment with the first steps towards actively participating as denizens of their city, feeling themselves as prospective geographers, as ‘designers’ who are keen to show off their own work, as critical inhabitants of the world surrounding them*” (De Vecchis, Pesaresi, 2011).

In particular, in a project such as “*Valorinvilla*” these tools can be used:

- Before the study in the field, in order to have a general idea provided by preliminary virtual excursions;
- After the study in the field, in order to make a new virtual excursion and to re-view aspects and elements directly observed, acquiring new information and details;
- During the phase of planning and operational work, since the various functions and the maintenance of geographic scale allows the students to propose valid and interesting hypotheses;
- During the phase of results presentation, by creating original and fascinating learning products which have been prepared by students with enthusiasm and high motivation.



Figure 1. *The boundaries of Villa Ada (Source: Google Earth)*



Figure 2. *Villa Ada in a view taken in 1943 (Source: Google Earth)*

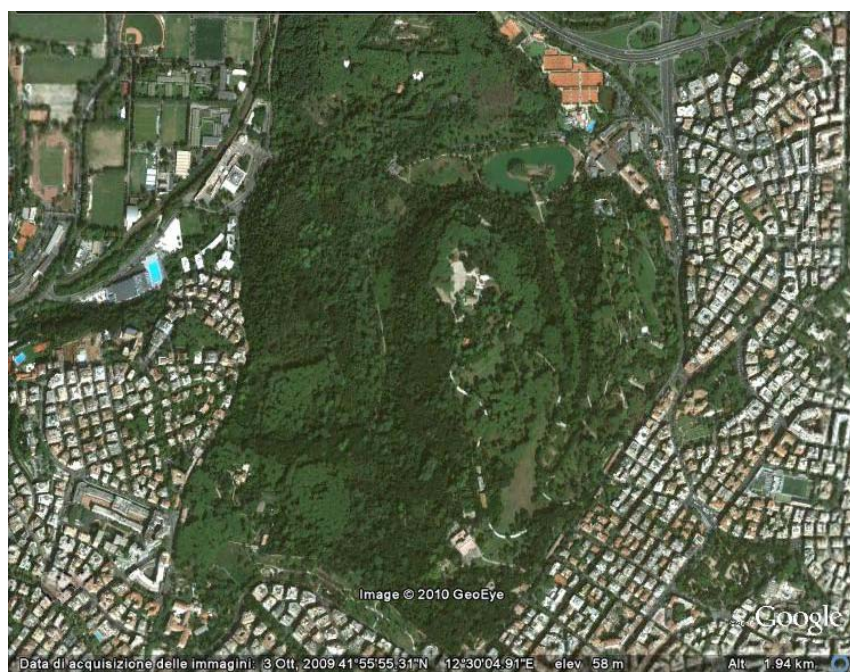


Figure 3. *Villa Ada in a recent view (Source: Google Earth)*



Figure 4. A detail of Villa Ada: the lake (Source: Bing)

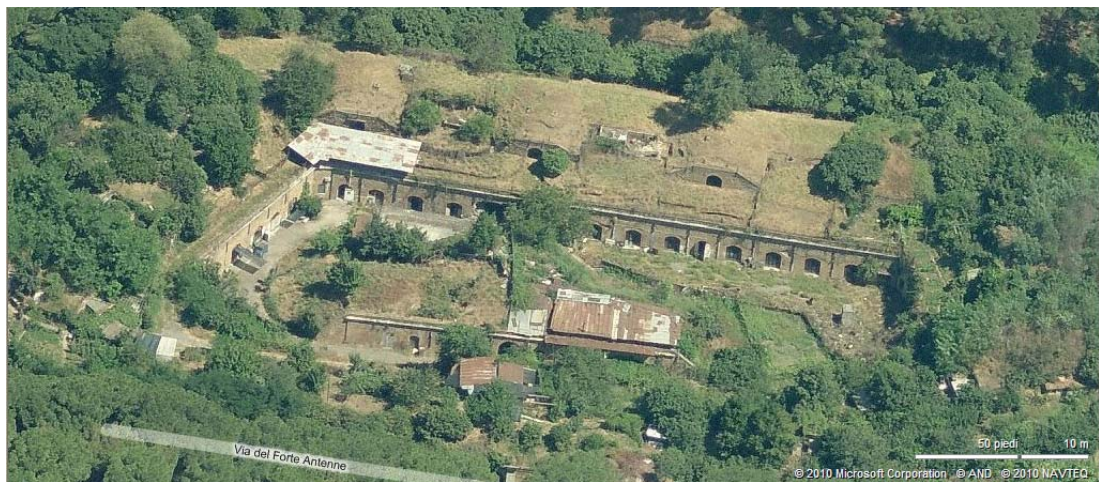


Figure 5. A detail of Villa Ada: the Forte Antenne (Source: Bing)



Figure 6. A detail of Villa Ada: the vegetation (Source: Bing)

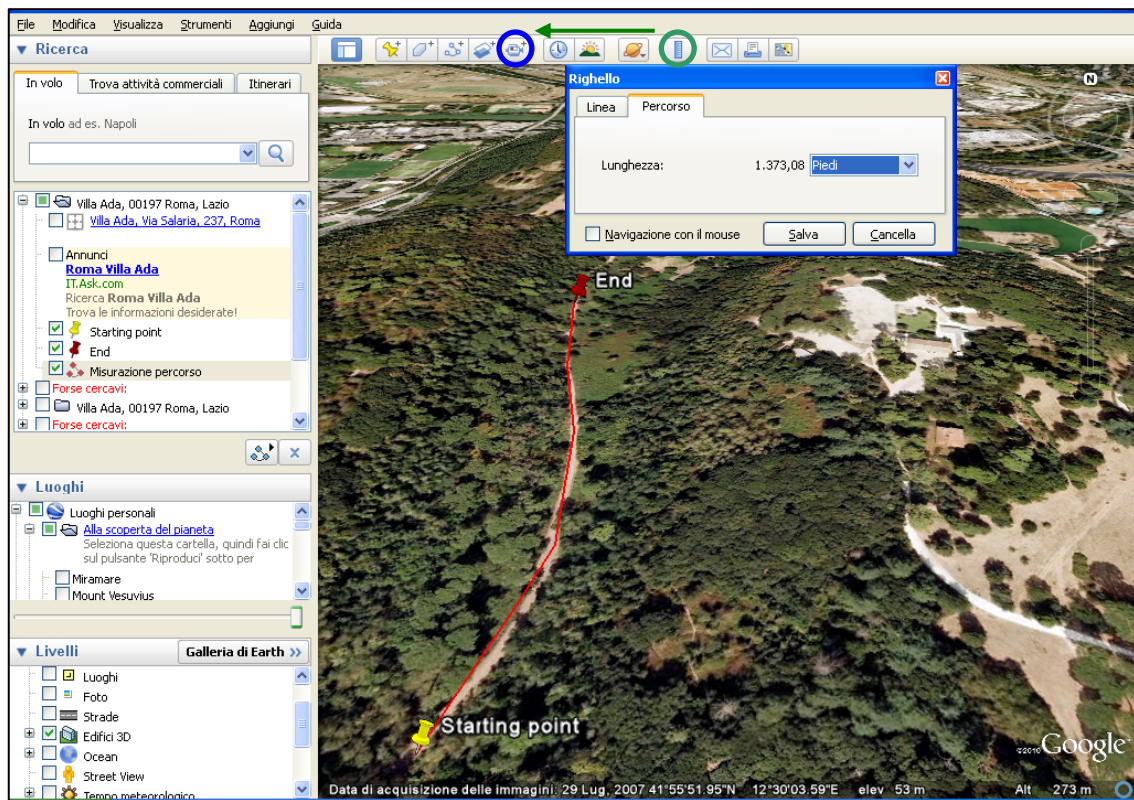


Figure 7. Example of a possible route which can be designed measured and recorded (Source: Google Earth)

Conclusion

A general geographic illiteracy and the inheritance of a geography that is mnemonic and based on merely factual knowledge have led to a continual reduction in the role of geography in Italian schools. Therefore, there is an important need for specific and organic projects designed to emphasise the educational values and the applicative implications of geography. In this perspective, the “*Valorinvilla*” project, created by the Rome and Lazio branches of AIIG and by the Geography Unit of Rome Sapienza University, can be seen as important for encouraging students of different age groups to study the territory and its features using new systems. The “*Valorinvilla*” project is also a significant example of how geography is able to involve and motivate students and how it can also encourage an interdisciplinary approach.

In fact, the project allows students to:

- Relate themselves to a part of their living (or known) space;
- Propose ideas of improving usability and come up with ideas on how to enhance local resources;
- Foster their critical thinking.

At the same time, the project is useful for:

- Working in groups and facilitating cooperative learning;
- Experimenting with new teaching and evaluating strategies;
- Carrying out a suitably coordinated and planned field study;
- Knowing the considerable benefits which can derive from an appropriate use of geospatial technologies.

Certainly, modern geography can provide remarkable inputs both in the educational field, and from the methodological and applicative point of view, and furnish also professionalizing tools. A very important role can be therefore played by GIS and virtual globes and world maps, which are able to produce a stimulating and entertaining way of teaching and learning geography and to encourage original and socially useful research.

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