GEOQUEST VESUVIUS A CLASS ROLE PLAYING GAME

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Synopsis:

This game story is set under the Somma-Vesuvius volcano. The environment that gradually reveals itself to the players is full of significant elements that can be traced back to a volcanic site, inserted in a specific geodynamic situation. It is located in the Mediterranean area, specifically in Campania, close to Pompeii and Erculaneum.

GeoQuest VESUVIUS
a Class Role Playing Game

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Abstract
GeoQuest Vesuvius is a class Role Playing Game to teach Earth Science and History.
The educational technology is based on the idea of using language which is closer to pupils to improve the teaching/learning process. The game seems to be a perfect vehicle for education, even more when cooperative, since the acquisition of knowledge and enhancing skills now requires more actual approaches. The use of tablets, smartphones, social networks, etc. is more comprehensible and funny for young people compared to traditional media. The several roles allow everyone to enhance their own skills and are perfect for a full inclusion of Special Education Needs (SEN) students.
We have already realized a role playing computer game called GeoQuest [1] creating at the same time a Role Playing Engine [2] which involves all students to the game through their personal mobiles or tablets giving a total interaction of the whole class to the game. The outcome of the class experimentation were excellent, both for didactic and educational results obtained [3].
This article is focused on our role playing game experience with the pupils. The students go through a virtual environment, which is progressively discovered by the choices done by them.
This game story is set under the Somma-Vesuvius volcano. The environment that gradually reveals itself to the players is full of significant elements that can be traced back to a volcanic site, inserted in a specific geodynamic situation. It is located in the Mediterranean area, specifically in Campania, close to Pompeii and Herculaneum, where there was compressive and divergent geological events, which produced differentiated magmas and explosive volcanism.
Players can also discover where they are from the story of some historical and mythological figures they meet on their path. They can interact to solve several quests appearing during the game related to mineralogy, volcanology, geodynamics, history, myths.

Introduction
The aim of the work is to use the latest ICT techniques to create innovative educational products. Our primary topics was Earth Sciences, History and Mythology all together in a unique interdisciplinary approach. We have already realized a first role playing computer game called GeoQuest creating at the same time a Role Playing Engine which can be easily applied to create new didactic games for the whole class.

Needs analysis

Learning processes

In current and modern learning society technologies and socio-cultural progress they seem to have given a big boost to the improvement of condition and lifestyle. Paradoxically, ours is a society that still suffers because of a considerable inadequacy of young and less young people compared to the demands of job world and civil society in general. And, regardless of the different national realities, this is directly bound with school failure. This seems to be related primarily to the inability in decoding written text, and then to the difficulty in properly retrieving information, in order to build skills then.

In fact, with the international surveys which have highlighted the gaps in students' knowledge, skills and abilities, it was set up a proper definition of literacy: "reading literacy is understanding, using and reflecting on written texts, in order to achieve one's goals, to develop one's knowledge and potential and to participate in society" (Pisa Framework 2006). Research has shown us that it is possible to repeat the text's content, even well, but that this doesn't imply at all that the meaning absorption happened, the true understanding of text [4]. At the base of correct understanding of a text there is therefore the ability to build a semantic representation coherent and well-formed [4]; [5]; [6]; [7].

In the school practice it is often given more importance to the elaborative inferences, necessary to personal interpretation [8], rather than the same understanding of text: students are encouraged in an interpretive activity, where perhaps there are no requirements for local understanding.

It is therefore necessary encouraging teachers and researchers to develop instructional strategies to foster these literacy skills.

Interdisciplinarity

We would like to highlight what this kind of multidisciplinary approach is increasingly required in the new teaching frontiers school: it is not simply the "connection" between scientific and historical, literary, mythological topics through interesting and captivating textual references. No. We intend to pursue the educational goal of "motivation" to the interdisciplinary study inside the "New forms of teaching". In particular the humanities, which continue to be perceived as non-functional and therefore not useable in global work market.

To accustom students to interactivity in which there are skills of a different kind, through an apparent simplicity of the game and autonomous reworking means that students get hard knowledge of the subjects studied, and they are making gradually accustomed to the work of continuous connection, in which knowledge is not divided into compartments (and should never be!) but blends harmoniously into a unprecedented unicum.

Our goal is to create an innovative methodology based on the game, that enhances the interdisciplinarity and the role of Earth Sciences.

Why a Game?

In the obligatory school levels, like in the longline learning, the game is an essential element and activity for the development of everybody's personality, especially in the perspective of learning to learn (Key Skills).

Learning to learn is recognized as a meta-skill which evolves with the student and becomes the thread that guides him to a successful assumption of responsibility for its own learning process. The most effective mode of realization of metacognitive teaching, it seems to be the self-regulating approach, in which students are helped in the process of recognition of the skills necessary for learning tasks

and they are encouraged for the choice and for the most productive application of appropriate learning strategies. [9]

When it can be useful to use a game? -at the beginning of a Teaching Unit, to introduce new elements; -at the end of a lesson, for learning reinforcement and "relaxing" activities after a particularly challenging phase [10].

"In a not didactic situation, through a set of conditions that allow the student to take control of the situation, the teacher allows a devolution of the situation. Devolution is not only introducing to students the game that the teacher wants him to play, but also making students feel responsible, in the sense of knowledge and not the guilt, for the result that he must look for. Devolution appeals to student motivation, which [...] must seek the best strategies that allow him to win. In conclusion, devolution is the act by which the teacher makes the student accept responsibility for a learning situation (a-didactic) or for a problem, and makes itself accept the consequences of this transfert "[11].

The teaching looks to the game and to problem solving mainly from two points of view:

1. The problem as a vehicle: use the problem in order to get knowledge realizing a "teaching for problems", creating every time problematic situations, even as a game, from which draw out ideas; in this case, then the problem solving is a vehicle, a methodological tool to be used to achieve learning objectives.

2. The problem as an objective: a teaching which develops in students the aptitude for problem solving; problem solving, then, becomes a purpose, id est, that is itself an objective for teaching intervention.

Socialization implies the ability to relate to other people and the discovery of the communication, that is the cultural attitude. The knowledge and the discovery of own abilities (which are not only the typically scholastic ones) is a fundamental step for self-acceptance and for the planning about oneself. Matching this discovery with the one outside of surrounding reality is the delicate, but strategic step to feel protagonist and to face own development tasks. [12]

Until now, serious games are a significant step forward compared to many ways of using informatic technologies in education, which, as it happens with the traditional e-learning, have often repeated the transmissive model, providing content with rich combinations of texts, pictures and possibly video and audio, but with limited possibilities for effective interaction with the teacher and with other students [13].

Why a Role Playing Game

What is a role playing game? In role playing game you play a character; you stay around a table (tabletop or multimedial whiteboard); the tale is shared. The last aspect is the most important that
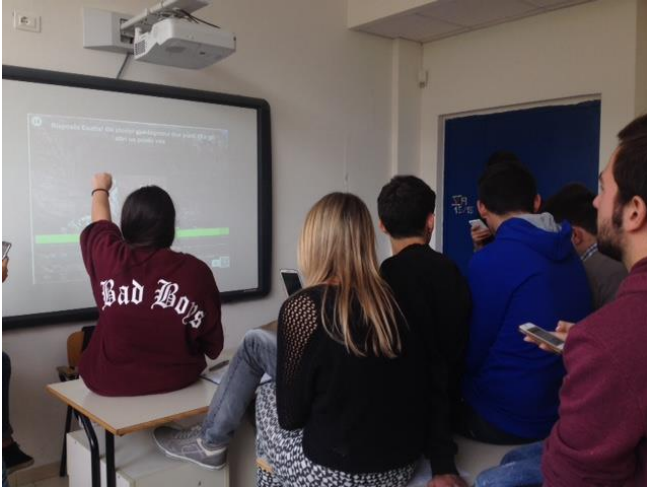
distinguishes the role play by any other computer game, including those which make use of avatars and virtual world. Even in them, in fact, the player carries on his own quest alone (you can talk about contemporary solitudes a maximum, if all students of the same class practice the virtual game at the same time).

The most current literature about this subject [14] highlights the following important aspects of the role play game in the educational field:

1.Motivation: if there is a desire to play unexpected resources may grow.

2.Cooperation: collaboration between characters (virtual world) collaboration between players (real world)

3.Identification: interpretation and comparison of different points of view.

4.Narration: same story from different points of view, same story with different unprovided narrative outcomes. Descriptions: places and characters.

5.Exploration: pretext for historical / scientific deepening. Possibility of "exploring" environments and situations in a way that the front lesson hardly allows.

6.Review: possibility of living possible situations but not real; ability to evaluate different outcomes.

7.Planning: analysis of situations, analysis of environments, analysis of interactions, analysis of personality. [14]

Why a Computer Game

Computer game means a game that makes use of a computer as the main support and it is played using a keyboard, a mouse or a joystick and a screen. Computerized games are a formidable gym to exercise the "core capacities" involved in cognitive enhancement activities, because reaching the game objectives calls for the simultaneous and coordinated application of a large number of mental processes such as visual attention, processing visus- space, executive function, learning ability and memory, in addition to experiment with their coordinated use in the situation [15].

The fact that all computer games can offer a rich cognitive stimulation, however, doesn't mean that the pure spontaneous use of those games is a vehicle to promote learning. Planning and / or using a computer game to promote academic success therefore asks you to respect some measures dictated by empirical research about Scholastic Achievement. Problems that require the exercise of content and skills covered at school, but presented as a game, with controlled difficulty, may be stimulants but not frustrating and thus they may promote cognitive functions about targeted content, a key element for the enhancement of learning. [16].

A key role consists of mediation. Among the main forms of mediation involved in computer game there is the automatic feedback: it refers to the error handling strategies proposed in the game. While in school activities the error is a potential source of frustration to be avoided at any costs, in the game it is a normal part of experience. After the error you can restart without any consequence, on the contrary, having learned something [16].

Our game

GeoQuest Vesuvius is a Class Interactive Role-Playing Computer Game.
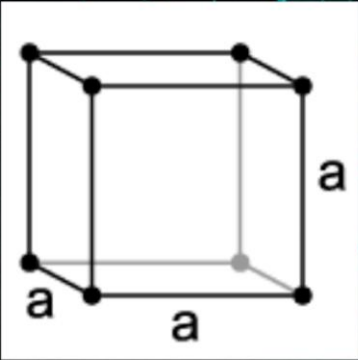
Which kind of game?

Class Role-Playing Game: it allows students to achieve a complex goal through cooperation.

Unlike other games or virtual paths, which are carried out individually by each student / player, with the role play the class group must cooperate.

The participants live a graphic adventure in which they face several choices of different paths with different opportunities. Furthermore, often the students must solve questions or quests to go on.

In role-playing games, players do not know where they are and the map of the location where they virtually move. Everything is revealed as players proceed: different choices create a new original game experience. Through a path choice or as output of some questions, the players change the experience.

In our game the players-students of a class meet some mythological and historical figures along the way. They tell their story introducing the player in an atmosphere of mystery and dramas.

The myths and stories belong to the place and time in which the game is set, and these are correlated to the path the players will reconstruct.

While the path is revealed through the stories heard by mythological characters, players proceed and find some clues to discover a final event. The clues are based on scientific evidence, mineralogy, volcanology, geodynamics, history and myths [17].

In this works we would like to improve understanding of the literary and scientific texts. Several recent OECD surveys show, in fact, the difficulties on texts understanding, both literary and scientific one. It is our intention, in part already begun in this work, to continue in this direction.

The humanistic way of this work plots historical, mythological and literary aspects through appropriate textual references. This shows the mythological and geographical origin through the work of Strabo and other ancient authors, not only of "Sterminator Vesèvo", but of the whole Campanian volcanic plain. Is intertwined here, the myth of the loving marriage between young Vesèvo and Capri, and then it connects the mythological origin of Herculaneum area through the narration of the hero, who seems to have given the opening words to the entire area: Hercules. There are ad hoc episodes and literary references

on the propulsive force of the mythological hero about the described places. The chosen literary passages are not chronological, but transversal and diachronic sort of story in the story, aimed at connecting knowledge of the students with the gradual pace of the game.

Large space is dedicated to the eruption of 79 AD through the sources by Pliny and the references by Tacito: the anthology section is focused both on the volcanic event description, as perceived by his contemporaries, and the educational material of the scientific topics inserted into the game, with a clear exposition. We would like also emphasized that the excerpt of literary passages chosen are taken from great narrative calibre sources. The work of Pliny, in fact, also in the coming centuries has been used by historians and scientists as essential reference of volcanic event, because it is considered direct evidence unfiltered by the passage of the next memory.

There are, also, the connections with the representation of Dante's Hell Valley with some of its mythological characters; the place found by Dante corresponds to the area affected by the path of magma and, as happened in the first part of our work about the Campi Flegrei, references borrowed expressly from Comedy are perfectly functional in educational objectives. As "frame" we put in the game specific elements of art history and historical events.

The engine

The system is realized with a specific software engine which, starting from a simple text file, create a new adventure.

The adventure plot is described in that text file which is processed by the engine. The teachers can create their own "adventure" writing the text file with a simple command language to play texts by the talking voice, show images and backgrounds, questions, jumps, etc. The system is multi-language allowing different text files one for each idiom.
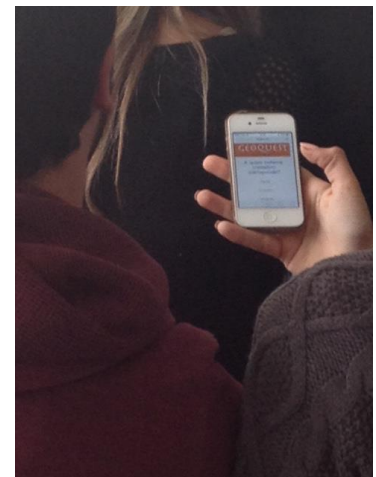
Testing

The first phase of experimentation was designed to test and improve the project during construction.

It was carried out in secondary schools, involving traditional classes (3rd, 4th, 5th year of High School) and open classes (aged 14-18).

The first test of prototype was performed in a high school. It was proposed the game to more different groups: A. a homogeneous group of students, after the developing of correspondent educational module (mineralogy and volcanology); B. a homogeneous group of students, before the developing of correspondent educational module, using the game as a "stimulus"; C. a heterogeneous group of students, during an extracurricular workshop; D. a reference group, which was not proposed the game,

consisted of students of the same class, who regularly treated the subjects of mineralogy and volcanology in the traditional way. The results of groups A and B, was excellent, in terms of learning, involvement and pleasure. Compared with group D, even students who normally were less concerned on the topic were fully involved. Group C has not been evaluated at the end, since they were students from different classes and different ages, but they showed great liking and played the game without difficulty and with a great spirit of cooperation.

Project Strengths
- Multi-language (CLIL compliance)
- Ease of create new adventures also on different topics
- Interdisciplinary between "sciences" and "humanities"
- A total new didactic approach.

Expected outcomes
- Development of new games and new teaching methods in general.
- Strengthening of Earth Sciences into science education.
- Increase in the teaching of the last generation ICT.
- Teaching support, through the use of materials that meet all of the latest instances of standards and methodologies.
- Teaching support with CLIL, with the ability to have all the materials in any language.
- Personalised teaching support (also in case of Special Educational Needs).
- Spreading a truly interdisciplinary training culture, exceeding the dichotomy science / humanities.
- Facilitation of learning, since the material created is usable both in the laboratory, either in place of the laboratory, and downstream of the development of a learning unit (as a conclusion and verification), or upstream (as a stimulus).
- Ability to use the Didactic Projector also for the skills assessment, as it can record the progress of each student.

Conclusions
Our Computer Class Role-Playing Games answers to encouraging teachers and researchers to develop instructional strategies to foster the literacy skills.
We reached our goal creating an innovative methodology based on the game, that enhances the interdisciplinarity and the role of Earth Sciences.
Roleplaying helps students to reach their goals easily through cooperation; unlike other games or virtual paths, which are carried out individually by each student/player. It can be used also for skills assessment [18], avoiding the error frustration through automatic feedback.
Moreover it represents a total new didactic approach, which supports teaching of the last generation ICT. Results showed great liking by teachers and students.
On a pure linguistic level, moreover, with this methodological approach you crumble another old contradiction: that the scientific language is a symbol of absolute accuracy, while the literary one sails for some aspects in the semantic imprecision sea. Indeed with this educational experiment we think we have offered a counter-example: while the scientific language presupposes a clear definition of terms, the use of literary texts and the consequent understanding and interpretation leads instead to analyze a wide range of synonyms and antonyms functional to the definition of the phenomena studied.
If we refer to the "book of nature" itself, by Galileo, we understand how true is that science use not only strict formulas but a mixture of languages intended to specify each other.

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