



## A New Approach to Multimedia Teaching by Means of Game Like and Selective Tests

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### Abstract

*The introduction of digital technology has deeply and quickly changed the social habits and personal attitude especially in the younger people. New generations are more and more conditioned by the new technologies whose development inevitably requires the formulation of new teaching tools and learning evaluation parameters. In this context the key point, as regards as the educational world, is not only the proposing a teaching model able to interest students through the richness of its contents but also expressed by means of a modern and multimedia language. In this paper a novel approach to teaching, based on the elaboration of a game - like strategies through the creations of interactive multidisciplinary tests, is presented and discussed. Overcoming challenges in fact represents a crucial element to stimulate concentration and learning. Only after passing a test it is possible to prove its result through, for example, a related laboratory experiment (in the case of experimental sciences) or a social inquiring (when studying human sciences). The integration between tests and new technology is realized by the proposal of suitable new applications for tablet and smartphone whose most important features should be represented by a true interactivity and a complete customizability by teachers and students. Another interesting important point of interest of the proposed new approach lies in its methodological generality making its application possible to a wide range of subjects.*

### 1. Introduction

Nowadays teaching is affected by several well-known critical aspects, related to learning plans formulation and the relationship with students. A lot part of these is due to impoverishment of contents and to inability to generate interest in the students. The latter question is also related to a deep modification of new generation's communication habits, substantially based on multimedia, due to the faster and faster development and diffusion of new technologies, like smartphones and tablets, while the teaching approaches are, in the most part of cases, still based on traditional techniques.

This in turn implies a modification and a re-design of teaching strategies in order to overcome these difficulties. Nevertheless, it is obviously insufficient to simply and unnaturally introduce new technologies in schools and universities without a suitable re-thinking of content and, above all, of teaching methodologies, often not so very interesting and stimulating. The world of new multimedia technologies promotes immediacy, creativity, real-time communication and competitiveness. All these features are fundamental elements of one of the most important human activity: the game.

In this paper we'll propose a novel teaching method based on game – like strategies, using interactive and multimedia tests, whose primary aim is to stimulate self-promotion and competition with themselves and with the other students. The proposed model is based on psychodynamic learning including problems and question challenging student's abilities and in which they experience a self-personal judgment. The game corresponds to a well – defined psychological choice able to intrigue students, satisfy senses and stimulate their ability to solve puzzles. This novel learning approach is able to improve intelligence, often limited by the traditional teaching methods, also contributing to the forming of character since game includes occasions of self – promotion as well as cooperation. The game is realized by means of new technologies in order to make it more interesting especially for the young students; this also allows us to ensure multidisciplinary application and upgradability of contents and software interface. The proposed game structure is composed by a series of tests of growing



difficulty in which the passage to the next level assumes the overcoming of the previous ones, each characterized by a score.

In this way the learning process takes place almost unconsciously since it is the necessary condition to pass to the higher levels and to gain the highest personal final score. The application of the above method implies the correct individuation of two aspects: the right content of game and its suitable multimedia implementation. This content should reflect the main topics of each matter of study and its most important concepts, while the multimedia the implementation should be as much impressive and simple as possible and guarantee its use on the latest devices as tablets, smartphones as well as on the “traditional” personal computers. In this paper we’ll analyze some examples of application of the above strategy to two of the most important subjects: mathematics and literary studies. As well known there exist remarkable examples of application of game to the study of mathematical problems but all of these doesn’t provide for a suitable logical and operative integration between different possible typologies of mathematical games and, above all, their educational multimedia implementation, where existing, are not based on true and complete interactivity and customizability. The educational idea, discussed in the present paper, intends to fill this gap by introducing an integrated totally interactive and renewable game – like mathematical strategy based on multimedia selective tests with a strong reference to the mathematical questions we encounter in our “every day” life.

This allows on the one hand considering very fundamental questions implied in them and on the other hand to study these questions in a funny and more interesting way. In the human sciences instead, suitable applications of the proposed method have initially regarded the transposition of some famous literature scenes into game strategy, whereas a subsequent level of application will concern the implementation of logical tests for philosophy, history and classical literature subjects (as Greek and Latin studies).

In the following we’ll discuss two examples of application of the proposed strategy respectively to science and humane studies, suggesting a schematic multimedia implementation into suitable software for PC, tablets and smartphones. The general structure of the above project is shown in the fig. 1.

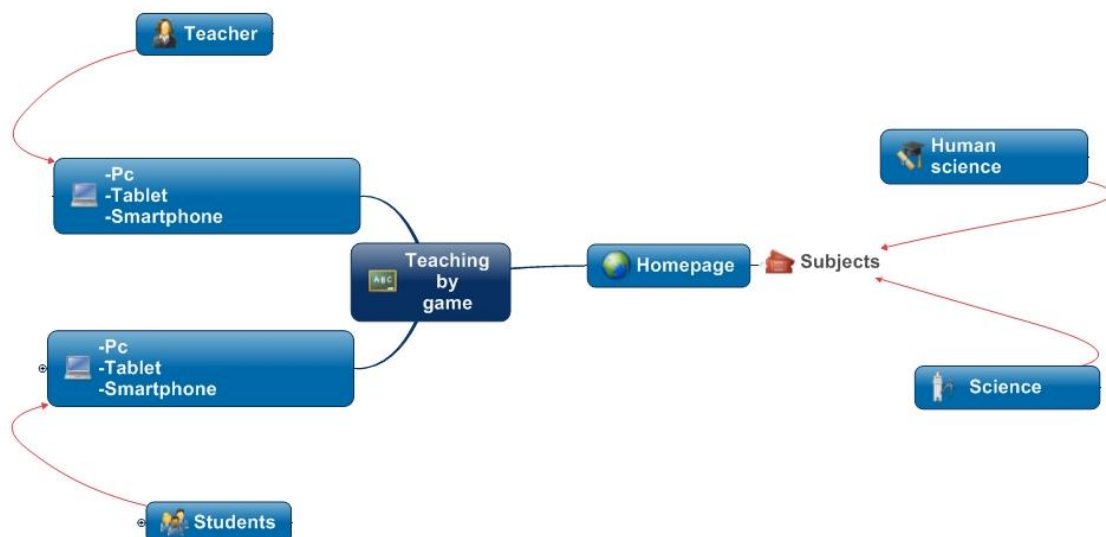


Fig.1. General structure of project “Teaching by game”.



## 2. An Example of application to human science: Dante’s journey through the “Inferno”

In the following we’ll discuss an application of our method to Dante’s journey through the “Inferno” [1]. After a short multimedia presentation, showing Dante’s historical age features and the general structure of the three reigns of Divina Commedia [1] (Inferno, Purgatorio and Paradiso), the learner will be able to start the journey only after passing an entry test. Every student – player will personify Dante, experiencing, through the virtual simulation, the original emotions (loves, hates, suffers and so on) of the literary characters in the Divina Commedia. Each dialog will be interrupted by one or more interactive tests, of different difficulty, about the character’s life, Dante’s reactions, etc. The following test typologies have been considered: text understanding, linguistic and stylistic analysis and multidisciplinary linking tests. Tests are structured like a video game in which “Dante – player” must solve association tests, “filling” tests, time games in order to “save” the damned souls. To every right answer it will be assigned, even considering the solution time, a partial score that will contribute to the final score, whose evaluation is divided into four levels: poor, sufficient / discrete, good / very good, excellent. Students can evaluate own performances by means of a temporal and a competition policy. The total score collected will contribute to the classroom score and, finally, to the school play list. As an example of application of the proposed method we’ll consider, in the following, the episode of the meeting between Dante, Paolo and Francesca in the Canto V of the Inferno. The dialogue between Dante and Francesca is stopped at a certain point in order to verify the student’s knowledge through the above listed types of interactive tests, in the same time the system will show (through a clepsydra) the time elapsed.



Fig. 2. An example of application to Human Science

## 3. An application to Science: mathematical games

Mathematical games have represented, until the ancient times, one of the most interesting, useful and amusing application of “serious” mathematics [2]. Their teaching and learning values cannot be refused. In this paper, within the general framework discussed, we’ll present an application the above game – like strategy to mathematics. The novel approach here presented is based on the realization of a game - strategy in which the student – gamer has to solve a multipart logical – mathematical riddle. In order to solve the riddle and win the match, the player must consider each encountered clue, represented by a logical and / or mathematical test. These can cover all the main mathematical and



logical subjects, ranging from logic to algebra to calculus of probability and so on. The test content, their consequential order, difficulty level and the final riddle solution are automatically and randomly chosen, at the beginning of every new game, by software platform created to support the proposed project.

The difficulty level can also be varied by teacher up to a maximum level for which the final solution could be not unique but ruled by a probability law. The tests are structured in a selective way such as the passage to next level is allowed only after the overcoming of the previous ones. The final score is the sum of the partial scores of each single test.

The software implementation of our idea has many important advantages as, first of all, the realization of interactive and multimedia test features (as audio / video), the updating of contents and the portability on different software / hardware platforms. Finally, it allows the real – time simultaneous participation of many gamer in the same classroom, school and university of among different educational Institution in different places.

The interactive feature of our project is also particularly important in science application where the logical / numerical nature of tests make it necessary the use of calculation and / or graphical representation tools, already implemented in our software platform. The following figure shows a possible example of the proposed game strategy applied to mathematical and logical subjects.

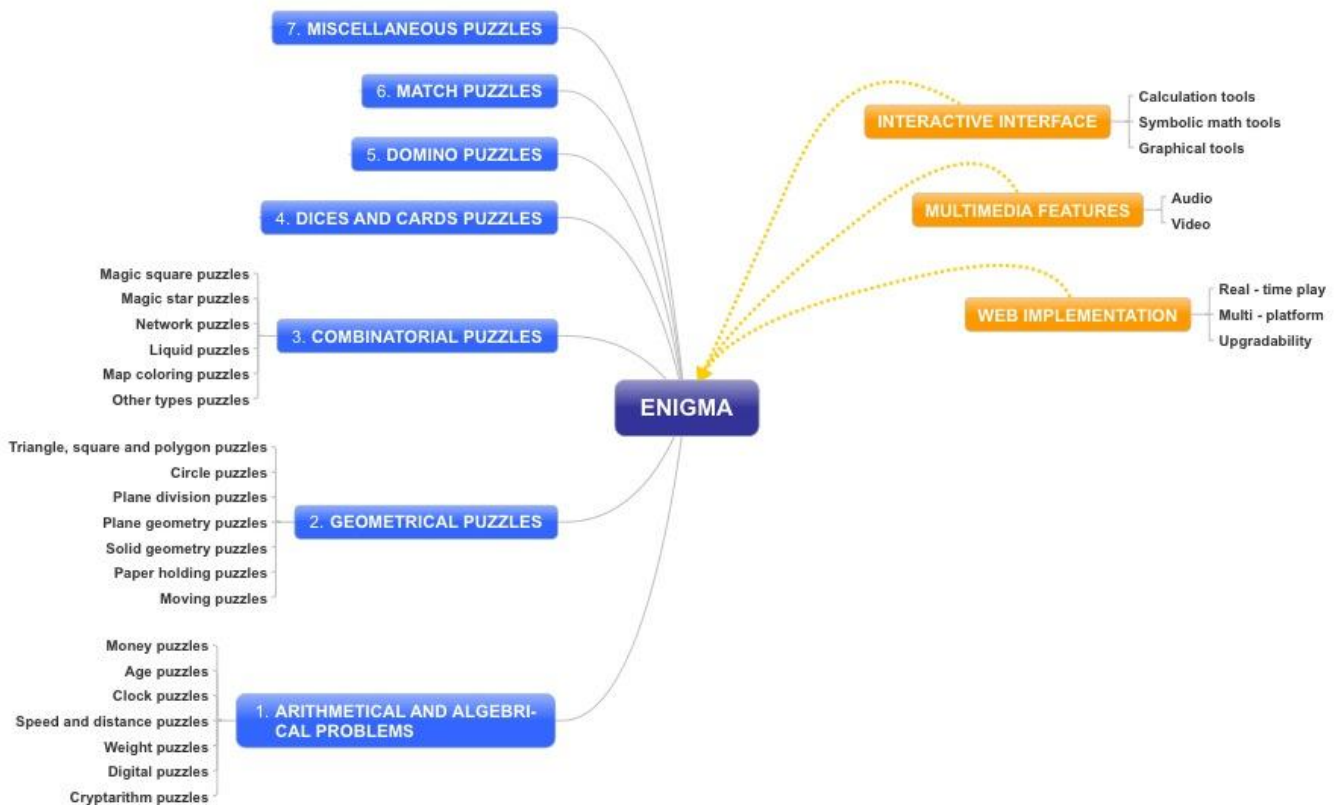


Fig. 3. An example of application to Mathematics

#### 4. Conclusions

In this paper we have proposed a novel teaching – learning method based on an interactive and multimedia game strategy, stimulating learning, and applicable to both human and scientific studies. The student experiences and learns through self – evaluation, decision making, self – promotion, and collaboration, using multimedia and new technologies as web applications, tablet and smartphone softwares, particularly liked by new generations. The key points of the proposed approach can be



summarized as: very high interactivity, complete upgradability and customizability. The implementation via web interface of the proposed learning – teaching method allows a very simple use on every hardware / software platform and multimedia device. Furthermore, its modular structure makes it usable in any type of learning institution from primary school to university and potentially applicable to all the scientific matters and human studies. The proposed learning / teaching method is still in a development step, but it is already rather promising, as showed by the test of a preliminary prototype whose results will be object of a future paper.

## **References**

[1] Dante Alighieri, *La Divina Commedia*, a cura di Natalino Sapegno, Mondadori Editore, 2005.

[2] M. Gardner, *Entertaining Mathematical Puzzles*, Dover, 1986.