

Production of Creative Game-Based Learning Scenarios

A Handbook for Teachers



Education and Culture DG

Lifelong Learning Programme

ProActive
Fostering Teachers' Creativity
through Game-Based Learning

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1. Introduction

This handbook has been developed in the context of the *ProActive EU Life-Long-Learning project*, which fosters creative teaching practices through the use of educational games (a.k.a. Game-Based Learning or just GBL). The project aims to create learning contexts where *teachers* from different educational levels *apply creativity in designing their own GBL scenarios using authoring tools*, similar to other visual applications that are used to create educational content. The educational value of the games is enhanced by the integration of different learning metaphors in their design.

ProActive provides teachers with two game editors: *EUTOPIA* a 3D virtual environment that supports collaborative learning and role-playing, and *<e-Adventure>*, a tool for developing 2D educational games. Teachers will be designing their own GBL scenarios in *18 pilot sites in four different countries* (Italy, Romania, Spain and U.K.).

Please read this document if...

... you are a teacher or educator at a school, university or other training/vocational education institution

... you are considering introducing games and/or simulations in your teaching methods

... you want to increase creativity in your daily classes

... you're interested in creating your own educational games, but you think an initial push would help you

This handbook is a practical guide for teachers and educators at all levels interested in designing and implementing their own GBL scenarios. A lot has been argued in favor of GBL in recent years, but teachers still find it difficult to integrate this approach in their current teaching practice.

This document tries to be a practical guide to help teachers in using games under the vision of the *ProActive* project and its three main principles: creativity, learning metaphors and GBL.

About this handbook

This handbook is structured in 6 chapters.

Chapter 1 is the introduction. Read this chapter to get some background about the *ProActive* project and this handbook.

Chapter 2 provides general background information about GBL. It is specially designed for readers who are taking the first steps in GBL. If you feel you need to improve your gaming background before developing your own GBL scenarios, please read section 2.1, which introduces games and their basic features. Section 2.2 introduces what we understand as GBL, and the motivation underpinning this approach. Finally section 2.3 provides a classification of games according to their educational value.

Chapter 3 provides some insight about the GBL approach proposed in *ProActive*, where the teacher plays a central role in developing the games and scenarios. Read this chapter to get

a better understanding of the advantages of developing your own games. This chapter is also recommended for readers seeking a brief introduction to the field of game development and the *ProActive* game-authoring tools: *EUTOPIA* and *<e-Adventure>*.

Chapter 4 is the core of this handbook, since it provides a practical guide for developing *ProActive* GBL activities. It addresses the use of the 5 learning metaphors in game design, the production of GBL activities, and the use of success factors to check the quality of the learning experiences produced. This section is a must for all readers.

Chapter 5 is a useful resource for teachers. It provides some examples of GBL experiences developed using *EUTOPIA* and *<e-Adventure>*. This information can be good for inspiring teachers willing to apply the *ProActive* approach in their classes.

Finally an **appendix** with a short guide to the literature is included for readers aiming to get a deeper understanding of GBL.

2. The Potential of Game-Based Learning

2.1. What are digital games?

To understand “Game-Based Learning”, it is necessary to reach a definition of digital games or video games first. Paraphrasing Jesper Juul, a reputed theorist in the field of video games, **a video game is**, generally speaking, **any game played using computer power and a video display**. It can be computer, cell phone, or console game. But this definition, which probably reflects what we all understand by the term “digital game”, doesn’t provide a real insight to such a complex medium. What is behind a good video game? Why are some games as successful and popular as top rank films, while others fail? What makes digital games so engaging? To answer these questions we must have a look at the characteristics that are present in most good digital games.

- **Conflict, Goals and Rules:** To engage players, games usually introduce an element of *conflict* that is well described and defined and which demands the intervention of the player. The game plot and narrative background are built around this conflict, setting the *goals and objectives* the player will have

to accomplish in order to complete the game. To achieve the goals proposed the player has to operate according to the *rules* of the game, which define what can and cannot be done in the game universe.

- **Short feedback cycles:** Games usually implement short feedback cycles. In this manner players perceive the impact and consequences that their actions have in the game world immediately (e.g. in an action game if you fail to solve a puzzle you get killed). This mechanism informs the player how well he / she is performing.
- **Immersion and engagement:** This characteristic emerges from the fact that games are designed to provide entertainment to the user. This is achieved in games through the application of different techniques: attractive stories, immersive 3D virtual worlds, increasing difficulty of challenges, etc.
- **Challenge:** An appropriate and balanced level of challenge is one of the reasons why games are so engaging. Good video games are neither too easy nor too difficult for players.

Conflict, goals and rules are present in most good games.



Figure 1. Screenshot of Half Life™. ©Valve Software.

For instance, in *Half Life™*, a very popular game, the player is transported to a secret research facility in New Mexico. Here an experiment goes wrong. The place fills up with hostile aliens. A group of Special Forces are sent to neutralize the incident. The player is in the middle of it all. Once the **conflict** is set, the **final goal** of the game is simple: escape alive. In order to achieve the goal the player will have to accomplish **different intermediate goals** (e.g. kill the final boss *Nihilanth*) using the **rules** of the game (e.g. using power modules to recharge the level of health).

➤ **Adaptability:** An almost unique characteristic of games - the fact that they run in a computer system allows the game experience to vary from one player to another and between different game runs. Adaptability is usually used in commercial games to vary the challenge depending on the player's skills and knowledge of the game, as well as to provide a balanced experience in on-line games.

One interesting example of adaptability is the game *Left4Dead™*, a first-person shooter. In this game, an artificial intelligence system, called the "*Director*", controls level pacing and item placements, creating a dynamic experience and increased replay value.

➤ **Replayability:** Good games can usually be played more than once. However, this characteristic is not present in all games. It is a result of a good design and an appropriate balance of characteristics such as adaptability (presenting different challenges each time) and immersion (a good game can be replayed just as much as a good story can be re-read).

Other characteristics are tightly linked to the context of the game, such as where it is being used, how it is distributed to the players, etc. Some of the most interesting of these, from an educational point of view, are:

- **Reward systems:** Games usually reward the players' achievements as a mechanism to increase engagement and immersion. One of the approaches, for example, is to give points to the players depending on the time taken to complete an action, the accuracy of the way they solved a problem or the choices they made. Sometimes the rewards that players receive are public and visible during the game as a mechanism of social recognition.

World of Warcraft is a Massively Multiplayer Online Role-Playing Game which is known because of its points system. The game usually rewards the player with a combination of experience points, items, in-game money and new skills and abilities after completing every quest in the game.

- **Competition:** Some video games stimulate "good" competition, not only between peers but also self-competition, through game scoring or online ranking systems. While some games seem to rely on complex technologies (e.g. powerful 3D graphics) to engage players, games like *Brain-Training™* have proven that fostering competition through this kind of element can be a very motivating factor.
- **Collaboration:** Some video games, especially MMOGs (Massive Multiplayer Online Games) promote collaboration between

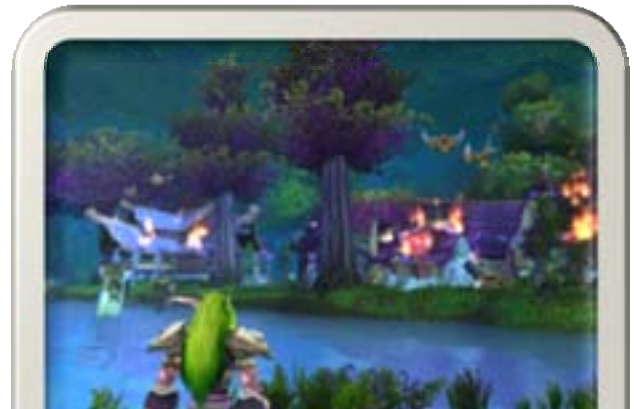


Figure 2. *World of Warcraft™* is a Multiplayer Role-Playing Game which is famous because of its reward system. © Blizzard Entertainment.

peers. While in some cases these games are designed as collaborative experiences, in other games collaboration arises as a choice of the players.

2.2. What is Game-Based Learning?

Game-Based Learning (GBL) is the use of digital games with serious goals (i.e. educational objectives), as tools that support learning processes in a significant way. It is also known as educational gaming.

Studies in the field of GBL show a clear relation between playing digital games and learning. There are a number of arguments in favour of digital games as learning tools. It is more often argued that they can enhance **students' motivation** for learning because of their engaging nature, as discussed in section 2.1. Indeed, digital games can provide challenging experiences that promote the intrinsic satisfaction of the players, keeping them engaged and motivated.

Moreover, players have fun while playing a game because they have to learn it. Indeed, in games, **the challenge usually increases as long as the game goes on**. Therefore players need to improve their skills and learn new strategies until the game is completed.

Another feature of digital games that is remarkably aligned to good learning is that games provide **short feedback cycles**. This allows players to explore the game environment freely, trying out their hypotheses, **learning by trial-and-error** and getting immediate information that they can use to redefine wrong assumptions in a risk-free environment. This cha-

racteristic is well aligned with educational requirements, given that most educational approaches require the educator to provide students with feedback about their achievements. Nevertheless, in traditional educational approaches where the instructor usually has to mark students' work using conventional means (i.e. manually) there is a significant delay until students can receive the appropriate feedback. Digital games can help to reduce such delays almost to zero.

Therefore, as digital games set the player in a world that is free to explore without requiring the intervention of an instructor, video games are an ideal medium to promote authentic learning and **"learning by doing"** processes, turning the student into the leader of his / her own learning experience. In this sense digital games can provide meaningful learning experiences by simulating highly interactive scenarios that professionals encounter in real-world settings, where they face open-ended, real-world problems.

In consequence, digital games represent a good medium to promote active learning and improve students' **problem-solving skills** and not only simple fact memorization. It has been demonstrated that for certain target groups (e.g. school students), they can increase personal fulfillment and lead to higher performance.

2.3. Towards a classification of digital games and their relation to learning

The current growth of the gaming field, as well as the increase in the quality and number of titles produced every year along with the fast moving evolution of new gaming technology, makes classifying games more and more diffi-



Figure 3. Screenshot of Nintendo™ New Mario Bros for Wii™, a good example of non violent action games. © Nintendo.

cult. However, it is interesting to observe how most of the general types of games we can make have some educational potential. Nevertheless, which genre would best fit to a certain educational context would depend on several parameters such as the learning subject, the study material, the pedagogical objectives, etc. *ProActive* provides the following classification, which takes into account potential educational uses.

- **Action:** This category includes both first and third person action games. This notion refers to how the player perceives the game; in first person the player seems to be part of the game, while in third person the player sees his/her own avatar in the game world. Many action games allow the player to switch from one mode to another.

Action games require good **hand-eye coordination and fast reflexes**. They usually promote resource planning, spatial abilities (orientation, mental mapping) and, depending on the setting, can be used to immerse the player in historic or professional environments.

Although action games can improve several types of skills, their application in educational settings is quite controversial because of their relation with violence. However, it is important to note that **action** does not necessarily imply **violence**. Action games usually present a conflict that must be solved by the player; while violence is one of the most natural ways to provide conflicts, good action games can be produced leaving this aspect aside.

- **Role-playing:** These are the games in which the player assumes the role of one or more characters in a fantasy environment. As the player usually depends on a

group of characters, cooperation and resource management are promoted. Moreover, these games can also promote strategic thinking and problem solving skills.



Figure 4. Screenshot of *The Secret of Monkey Island™*. The *Monkey Island Saga* is considered a reference in adventure games. © Lucas Arts™, 1990.

Role-Playing games usually include **points systems**. These points systems can be adapted to be used in education as a means **to evaluate the players' performance within the game, or to provide social recognition**. Depending on the setting, these evaluations can be made directly available to educators, turning games into aids not only for teaching, but for evaluation of the learners' outcomes.

- **Adventure:** In these games, the player has to solve a series of problems and puzzles embedded within a **narrative structure** to progress in a story. They encourage exploration and **problem solving skills**, and promote the establishment of relations between different concepts.

The use of puzzles also helps to establish a challenge and generates a problem-solution-effect cycle that helps both in the entertainment they provide and as a learning vehicle.

- **Strategy:** Usually set in historic or fantasy environments, these games force the player to plan the use of resources and face an enemy following an established set of rules. Thus, they encourage **short and mid-term planning**, as well as the understanding of a usually complex set of rules. Depending on their realism and environment, they can be used in educational settings in order to recreate historic events.
- **Simulations:** These games simulate real processes, events or environments, through the use of a simplified model. They allow the player to freely modify the environment and perceive the results of his or her actions on this environment. Typical domains are usually machinery (e.g. a combat plane), cities, hospitals,

universities, etc. This type of games achieves a high educational value in the simulated field, by allowing exploration and theory confirmation through the observation of the different interactions and their results.



Figure 5. Screenshot of *Age of Empires™*, a classic strategy game. ©Microsoft™, 1997. This kind of game has been used in education to improve resource management skills.

spite of their important commercial success, they have limited educational value.

The table below summarizes the learning possibilities in relation with the different game types described. Different examples are also provided for each type of game.

- **Fighting and sports:** Some people would argue that fighting and sport games belong to the action type. However we consider sport and fighting games as another type because of the number of the titles the industry produces every year. However, in

Game type	Examples of games of this type	Educational value
Action	<p><u>Violent</u>: Counter Strike, Call of Duty, Battlefield, Tomb Rider, 1942; America's Army, Brothers in Arms, Gears of War, Callout 3.</p> <p><u>Non violent</u>: Mirrors Edge, Super Mario Bros, Re-Mission, Need for Speed, Mario Galaxy, Pac-Man, Asteroids.</p>	Resource planning, spatial abilities and immersion
Role playing	Fable, Dragon Age: Origins, Dragon Age 2, Neverwinter Nights, The Elder Scrolls, Baldur's Gate.	Cooperation and resource management. They also promote strategic thinking and problem solving
Adventure	Braid, Portal; Monkey Island, Maniac Mansion, Zelda; Indigo Prophecy, Heavy Rain; King's Quest; Spyro, Callout 3.	To tell stories / encourage exploration, problem solving and the establishment of relations between different concepts
Strategy	Civilization, Lemmings, Starcraft 2, Supreme Commander, Age of Empires, Dune II, Warcraft, Command and Conquer.	How to solve problems / encourage planning / understanding of complex set of rules / recreation of historic events
Simulation	The Sims, Sim City, Angry Birds, World of goo; RollerCoaster Tycoon, Theme Hospital; F-16 Allied Forces, Il-2 Sturmovik, X-plane, Flight Simulator.	Live in virtual worlds / exploration and theory confirmation / observation of the different interactions and their results
Fighting and Sports	Fifa Soccer Saga, Pro Evolution Soccer, NBA Live, Tekken (saga), Street Fighter (saga).	Teamwork, sport practice / hand-eye coordination and reflex

3. Creating my own educational games

3.1. Why create my own GBL scenario?

For the reasons mentioned above, an increasing number of teachers and trainers recognize the value of digital games in education. Most of the successful Game-Based Learning (GBL) experiences have used mainstream games, like Civilization, the Tycoon sagas or The Sims. These games are usually referred to as “Commercial-Off-The-Shelf” (COTS) games, because they are ready to be used; teachers or educational institutions just need to go to any retail store and purchase them for from 10€ to 70€. Some students could even have a copy of the game at home.

Thus, what is the point of creating my own educational games, if there are things out there ready to be used? **Creating a game is a time-consuming task**, so in an already time-constrained curriculum where educators are usually struggling to achieve the goals defined by educational regulators and institutions the question is “It is worth taking the time?”.

There are clear benefits that come from using custom games developed directly by educators instead of using COTS. Indeed, some barriers to the implementation of GBL in formal learn-

ing settings have been identified, and can be summarized as follows:

The lack of integration of most games with the current curriculum and the lack of appropriate assessment frameworks inhibits GBL.

Indeed, COTS games are developed to be entertaining, not educative. Games like *Little Big Planet™* or *The Age of Empires™* provide contents that are rich and valuable from an educational perspective, but also include errors, misconceptions and inaccuracies to make the games more attractive. This is usually a concern that parents show when they are told that their kids will be using games in the classroom.

In addition, **COTS games are not always easy to align with current curricula**, or do not meet educational standards.

Technical and logistical issues (cost, licensing, limitations of computers, technical support).

Indeed, COTS games can demand last generation computers which are not always present in educational institutions. Or if they exist, educators may not have the adequate privileges or support to install them.

In order to overcome the above mentioned challenges, *ProActive* proposes a framework in which **teachers / trainers would design and implement their own learning games**. Or at least, actively contribute to this process.

Indeed, educational games available in the market generally do not meet educators' expectations. Actually the **quality of many commercial educational games** is low. This could be related to the fact that big gaming companies tend to ignore the educational market because of the difficulties posed by a wide and varied curriculum, a lack of interest on behalf of educational policy makers, the inability of schools to find the sort of money that commercial games tend to require and also the security issues associated with large institutions with small IT budgets.

Thus, educators can profit from developing games *for themselves* that have direct relev-

ance to their teaching objectives / students' profile, and that meet the requirements of their own institutions or educational standards.

3.2. Game editors, platforms and authoring tools.

Nevertheless, the creation of high-quality games is a hard challenge, with multiple approaches and possibilities. Which is the best option for teachers and educators, who may not have an extensive technical background, or a big budget at their disposal to hire a professional development team?

Most of the people who develop their own games use game development frameworks, which tend to be more or less professional tools. For example, *Microsoft™ XNA* is

a popular framework which enables the development of games for the PC and the XBOX. *OGRE* is another framework centered in 3D environments which allows the development of games that can be executed in almost all

Games can improve learning ... but will also improve students' academic achievements?

There are games with educational potential but which are difficult to link to the official curricula.

Good examples are Real-Time Strategy Computer Games like The RollerCoaster Tycoon™ Saga, Virtual U or SimCity saga, where players adopt the role of business managers. In these games players have to take the management decisions of an organization. For example, in the RollerCoaster Tycoon the goal is to build and administrate a theme park that is profitable.

The potential of these games is almost evident since they can help students in developing highly valuable skills like resources management or decision making, but it is uncertain if this will result in a better performance on exams and as a consequence in a tangible academic improvement.

Operating Systems. However, game programming skills are needed to use these platforms, making this a problematical alternative for educators.

There are also **game editors that hide the programming complexity** of developing games. These platforms are less technical and more visual, closer in appearance to tools like Microsoft PowerPoint than to integrated programming environments.

Some examples of these tools are **3D Game Studio** or **RPG Maker**. The first is a high-quality tool for developing all kind of 3D games. The second is specifically devoted to Role-Playing Games. Another interesting example is Unity, a powerful game development authoring tool that allows the creation of professional video games that run both on computer and consoles such as *Nintendo Wii™* or *Play Station Portable™*. However, these tools are sometimes too complex for non-professional developers. For example, it is very typical that some tools allow the configuration of some parts of the game through a user-friendly interface, but for others the author needs to produce programming-like scripts. Besides these tools are not oriented to education, which makes it hard to deal with issues that are inherent to the domain. For example, it's interesting that game creation platforms feature systems that facilitate evaluation and debriefing. This kind of feature makes the teacher's job easier.

To address this problem, *ProActive* proposes two game authoring tools that have been specifically created for education: EUTOPIA and <e-Adventure>.

3.3 *ProActive* tools: EUTOPIA and <e-Adventure>

EUTOPIA

EUTOPIA is an online 3D role-playing environment similar to other virtual environments like *Second Life™*. With this platform educators can create virtual scenarios where students play a role and simulate a specific situation. EUTOPIA can be used to improve negotiating skills and intercultural awareness of professional trainers and staff in contact with the public.



Figure 6. Screenshot of a EUTOPIA game scenario

The game development process in EUTOPIA is quite straightforward. Teachers just need to

select one of the predefined 3D scenarios (e.g. a city or a meeting room), select the roles that will take part (i.e. define the personality and choose a predefined avatar for each character) and assign them to each participant/student. Then the teacher must set up a virtual session (i.e. simulation) in a server using the created scenario (a dedicated EUTOPIA server is avail-

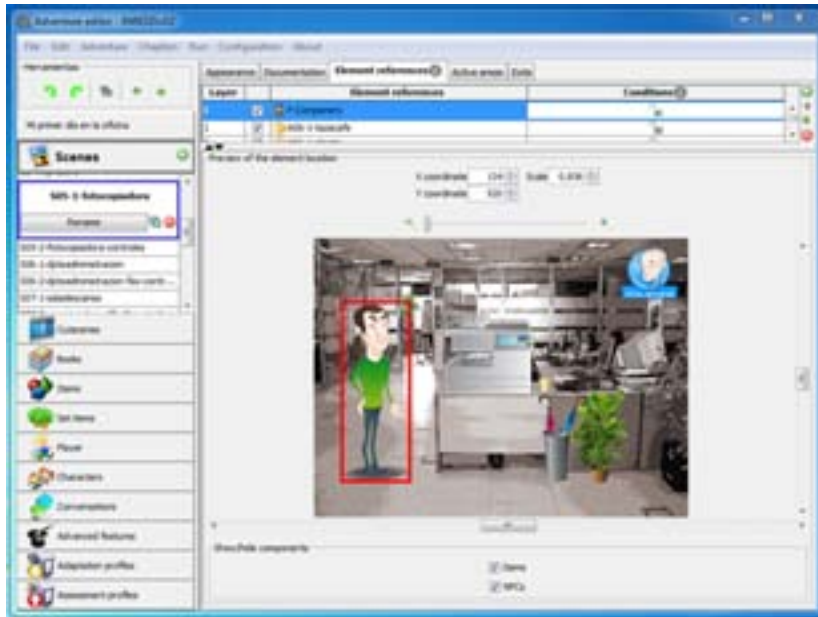


Figure 7. Screenshot of the <e-Adventure> editor. The image shows a character being placed on the scene.

able for *ProActive* users). Participants and teacher join the session and then they interact with each other, following the teacher's plan.

EUTOPIA includes several debriefing tools for teachers. For example, they can record the whole simulation and play it back later on.

<e-Adventure>

<e-Adventure> is an educational game authoring platform centered in the creation of *point-and-click adventure games and simulations*. In these games, which are fully 2D, the player explores the game world using the mouse. When the mouse pointer is over an interactive element (e.g. a character the player can talk to) visual feedback is provided. Then the player can trigger the interaction (e.g. start a conversation) by clicking the mouse.

The range of games that can be created with <e-Adventure> is more heterogeneous than with EUTOPIA, but also the edition process is more time-consuming. <e-Adventure> provides teachers with a user-friendly game editor that allows them to define the characters, items, and scenes that will compose the game. Then they also define how they are linked within the game.

<e-Adventure> includes two features that are very interesting from an educational perspective. <e-Adventure> includes a configurable

tracking system to monitor students' interaction with game. Therefore students' progress can be recorded and used for evaluation. Tracking data can also be used to modify the game flow, taking also into account student characteristics and profile (e.g. known disabilities, prior knowledge, etc.). <e-Adventure> games can be easily distributed through the web. Besides, <e-Adventure> games can be delivered through a wide set of e-Learning platforms like *Moodle™* or *Sakai™* which can also establish an active communication with the games. This is useful for the exchange of information for assessment and debriefing, for example.

4. Design of ProActive GBL Activities

4.1. Designing with a Sound Pedagogical Background: The 5 Learning Metaphors

The first step for designing a Game-Based Learning activity is to define the elements that characterize an educational game. Then it is important to link these elements to a solid psycho-pedagogical paradigm.

In *ProActive* we consider that we don't learn in just one way, but in different ways that depend on personal aptitudes, on the situation where learning takes place and on the content to be learnt. The five metaphors of learning model is a description of different ways of learning for different people, embedded with learning theories. Each metaphor represents a preference for learning that is not exclusive. In fact, every person is able to use a different combination of the metaphors in different situations.

The five metaphors are: acquisition, imitation, experimentation, participation and discovery, and are briefly described below.

➤ **Acquisition:** Regarding the acquisition metaphor, the idea is to transfer information

from one who possesses it (the teacher) to another one who acts as a passive receiver (the learner). It doesn't matter who the learner is and how he / she prefers to learn, as learning is always a repetition and a replication of the acquired knowledge, or product of an individual mental activity.



➤ **Imitation:** The imitation metaphor focuses on modeling behaviours by observing others' reactions to events. The leading idea is that vicarious learning experiences can help to shape one's own actions.



➤ **Experimentation:** This metaphor is closely related to "learning by doing" processes. It applies to learning specific activities, complex or dangerous tasks, as it promotes active and contextualized learning processes, mainly related to practical activities and skills (including refining movements). It generally applies to individual practices, but may include some social activities, such as the coordination of teams.

- **Participation:** This metaphor focuses on social aspects of learning. Indeed, the content transmitted by the teacher acts as a stimulus for learning, but he / she cannot predict learners' actions (new meanings and learning paths are created).
- **Discovery:** Discovery comes from transformative actions through engagement with learning materials and situations, and allows for "incidental" learning experience. Learning by discovery can be individual and / or social; the crucial point is that it creates new contents through an active involvement of the learner.

Taking into account the metaphors in the design phase of the activity can help them to increase the pedagogical value of the resulting GBL experience. Besides, thinking about which metaphors they want to use is a way for teachers to escape from the traditional learning model and include innovative and creative teaching practices in their daily strategies.

The next grid summarizes the relation between each metaphor and educational games based on these features:

- *Learning objectives*, understood as brief, clear, specific statements of what learners will be able to perform at the conclusion of activities

- *Role of the teacher*, which varies from traditional teaching since in *ProActive* teachers are designers of the learning process and also of the educational game(s).
- *Role of the learner*, who shifts between being a passive recipient and an active producer of knowledge.
- *Game environment*, i.e. not only the virtual world and game mechanics being used but also what surrounds the game (e.g. how discussion between peers is handled).
- *Learning strategy*, considered as the paths that the respective metaphor provides in order to promote an effective learning process.
- *Dominant gaming aspects*, referring to the gaming aspects that are preferred or which better suit each learning perspective.
- *What promotes learning*, referring to the game mechanics that promote learning.
- *Nature of the task*, which can be *open* (predominance of player freedom to self-direct the experience) or *closed* (the experience is more guided).

	Acquisition	Participation	Discovery	Imitation	Experimentation
Learning objectives	Fact memorization: to acquire notions and concepts	To be part of a community	Create new relations between objects and concepts	To gain expertise / Improve practical skills	To gain expertise / fluency
Role of the teacher	To explain, question and evaluate through the game	To facilitate the interaction between peers in the game	To create a game full of undiscovered meaning; to guide the students in their discovery process	To show / create a model for imitation	To provide a task and let the learner experience it within the game
Role of the learner	To pass levels, advance in the game or reach the highest score by using the acquired knowledge or by answering the game questions	To contribute by interacting to the development of the task	To discover / construct meaning within the game environment	To make a perfect or improved copy of the model proposed	To practice and experiment with the task within the game
Game environment	Learning material integrated with game plot, atmosphere and graphics	Virtual environment to construct and share with others	World with its own rules / meanings to be discovered /created	Location for observation and repetition of others' experience	Safe environment where errors can be experienced
Learning strategy	View of the contents, possible multiple review of the data	Interdependence, sharing of meaning	Manipulation, exploration, deep understanding	Repetition of models and reward	Trial and error
Dominant gaming aspects	immediate feedback; clear goals, self-induced reward cycle, challenge	Competition / collaboration; adaptability / goals common to the community	Rules, engagement / immersion, flexibility, interactivity	Rewarding system, short feedback cycle, replayability	Challenge and replayability, feedback, rewarding system

What promotes learning	Self-induced reward cycle (the challenge to reach a reward or a higher score)	The feeling of being part of a community of practice, social recognition	The challenge of mastering the game world, curiosity, intrinsic motivation to experiment	The credibility of the model, consideration for the role-model	The experience of the consequences of the action taken
Nature of the task	Closed	Open	Open	Closed	Closed

4.2. Design of GBL activities

In order to design meaningful GBL activities, it is important to consider many aspects. Indeed, the game should be perceived as embedded in a learning scenario that takes into account the different parameters of the teaching/learning context. While planning their GBL scenarios, teachers/trainers should take into account the specific characteristics of the learning audience, the specific learning objectives, the evaluation approach, the time-space resources or the technical requirements of the games. Moreover, the step by step organization of the learning activities (i.e. structure of the activities before, during and after the game) should be planned.

Below is a guide that can be followed by teachers/trainers, in order to consider all these aspects before designing their game. It aims at facilitating teachers' process of designing their own GBL scenarios. It provides them with

guidance and stimulates reflections on the necessary elements to be defined.

To make it more understandable we alternate the description of the guide with a case study based on the game *Business trip to London*. This game was developed by CATEDU (Centro Aragonés de Tecnologías para la Educación), a Spanish regional center for educational technology. *Business trip to London* was designed for learning vocabulary needed for planning a trip. It is designed to be used in primary and secondary school settings to teach English. The game can be used in several ways: as an introduction to an English session, to gather students' initial knowledge about travelling, or as homework. This game is freely available at:

<http://catedu.es/webcatedu/index.php/descargas/e-adventures>.

Table: Guide for designing a GBL scenario.

TITLE OF THE SCENARIO	
Keywords	
Who do I want to teach?	
Age Range and grade of the learners	Examples: <ul style="list-style-type: none"> ➤ 8 year-old pupils from 2nd grade of primary education ➤ Computer Science Master students ➤ Adults following a management course
Learner special characteristics	Examples: <ul style="list-style-type: none"> ➤ Learners with hearing problems ➤ Immigrants / Foreign students with language difficulties ➤ Adults with low ICT skills
What do I want to teach?	
Learning Subject/ field/ skills	Examples: the subject of the learning scenario is related to the curriculum for: <ul style="list-style-type: none"> ➤ History, Physics, Literature ➤ Social studies, Psychology, Computer science ➤ Transversal skills (literacy, numeracy, analytical skills, social skills, etc.)
Specific Goals	Example of pedagogical objectives of the scenario: <ul style="list-style-type: none"> ➤ Learners should memorize / get familiar with specific notions and content ➤ Learners should arrive at new knowledge and develop new concepts through communication and collaboration with peers ➤ Learners should learn to be part of a community ➤ Learners should arrive at new knowledge and develop new concepts by recognizing / creating new relations between known objects / concepts ➤ Learners should gain expertise / mastery ➤ Learners should gain fluency in specific practices / skills

How do I want to teach?		Rate 0-5
Learning metaphor that can support the learning objectives	Acquisition (I will transmit / present / explain content to the learners)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
	Imitation (I will show the learners how to do things related to this subject / content, i.e. I will be a model for them)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
	Discovery (I will provide the necessary artifacts for the learners to find out / discover a specific concept / knowledge on their own. I will organize guiding activities and provide tips)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
	Participation (I will organize sessions in which learners will discuss, share and / or collaborate for learning a specific subject / content and I will facilitate the interaction between them)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
	Experimentation (I will organize activities in which learners will understand, learn how-to, practice, and / or exercise)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Description of the game	Narrative description of the game plot	
	Goals	
	Characters	
	Scenes	

		Learning settings	Estimated Time
Narrative description of learning activities - step by step organization and structuring	Before the game:	Examples: In the classroom / at home / at distance / online, etc.	
	During the game:	Examples: In the classroom / at home / at distance / online, etc.	
	After the game:	Examples: In the classroom / at home / at distance / online, etc.	
			Total:
How will I evaluate students?			
Evaluation approach	<ul style="list-style-type: none"> ➤ Examples on how learning impacts will be measured: <ul style="list-style-type: none"> Group discussion Test / exam Project based assignment Personal portfolio Feedback from students 		
What will learners need in order to achieve learning objectives?			
Prerequisite	Examples of prerequisite: <ul style="list-style-type: none"> ➤ Previous skills, such as English reading ➤ Previous knowledge, such as historical facts related to World War II 		

Settings and materials	Examples: <ul style="list-style-type: none"> ➤ An environment that permits communication / sharing ➤ A set of specific rules ➤ Material / model for observation and repetition of others' experience ➤ A safe environment to practice
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What do I need for implementing the scenario?

Applications involved	Mandatory	Examples: <ul style="list-style-type: none"> ➤ <e-Adventure>/EUTOPIA ➤ Flash Player
	Optional	Examples: <ul style="list-style-type: none"> ➤ Image / video / sound editing tools
Infrastructure/ equipment	Mandatory	Examples: <ul style="list-style-type: none"> ➤ Internet connection ➤ One laptop per learner
	Optional	Examples: <ul style="list-style-type: none"> ➤ Camera ➤ One projector ➤ One microphone
Learning Resource Type		Examples: <ul style="list-style-type: none"> ➤ Book / digital book on World War II ➤ Video on non verbal communication ➤ Images showing CISCO equipment
Time / Space resources		Examples: <ul style="list-style-type: none"> ➤ Two sessions of two hours face-to-face with learners ➤ One 45 minutes lesson and one 45 minutes workshop ➤ One classroom

Other things to consider

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Table: Example of using the guide with the *Business Trip to London* game.

TITLE OF THE SCENARIO		Travel Vocabulary - <i>Business Trip To London</i>	
Keywords		English, vocabulary, game, travel	
Who do I want to teach?			
Age Range and grade of the learners		Primary school students (6-12 years-old)	
Learner special characteristics		- Not applicable -	
What do I want to teach?			
Learning Subject/ field/ skills	Subject: English as a second language Skills: Grammar and usage (basic), Vocabulary (medium), Reading (basic).		
Specific Goals	<ul style="list-style-type: none"> ➤ Learners will acquire specific knowledge about travelling (e.g. ticket, plane, flight, aisle, etc.). ➤ Learners will be able to hold real conversations about travelling (e.g. book a plane ticket, get a hotel, etc.) 		
How do I want to teach?			Rate 0-5
Learning metaphor that can support the learning objectives	Acquisition (concepts transmitted explicitly when an answer is wrong)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
	Imitation (just a couple of characters to imitate)	<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
	Discovery (vocabulary can be discovered by exploring the game world)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	
	Participation (learners discuss and compare results outside the game)	<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
	Experimentation (try-and-error to solve puzzles)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	
Description of the game	<p>Narrative description of the game plot In the game the player has to plan a business trip to London. The story is divided in 4 situations to be dealt with by the player.</p> <p>Interaction is mostly point-and-click. While the player interacts with the characters in the game they will be asked to choose appropriate phrases in their context or fill in the blanks with the right choice. If the player fails an answer then she or he cannot continue (a second chance is given).</p>		

These are the four levels in the game:

- Buy the plane ticket using a telephone purchase system. In this phase the player will have to answer questions about schedules, fares, etc.



- Airport arrangements: Check-in and security control situations.



- Arrival in London: the player has to ask **approach** a passenger **who** seems to be lost at the airport. Then, the player has to find out how to get to the city center using a taxi.



- Hotel arrangements: The player has to solve a misunderstanding regarding the price of the ride with the taxi driver and ask for a receipt. Then the player has to go through the check-in process at the hotel.



These four situations alternate with drag-and-drop "fill-in-the-blanks" mini games to enhance interactivity.



Goals

To complete successfully all four situations defined in the game.

Characters

Telephone sales assistant; Flight assistant (at check-in desk); Policeman (provides help at London airport); Woman (passenger that is lost at the airport, seeking for help); Taxi driver; Hotel receptionist.

Scenes

Player's Office; Airport (inside & outside); Hotel (outside & inside); Hotel Room; Arrivals (at London airport); Mini-game scenes

		Learning settings	Estimated Time
Narrative description of learning activities	Before the game:	Introduction to the module / lesson / session driven by the teacher. Short explanation about the running and interacting with the game (in the classroom).	15 minutes

	During the game:	During game-play the teacher supervises the session and identifies potential problems (in the classroom)	20 minutes
	After the game:	Teacher collects assessment reports produced by the game. Short debriefing session (in the classroom). In the next session the teacher will analyze the results and solve all the misconceptions and errors.	10 minutes

How will I evaluate students?

Evaluation approach	<ul style="list-style-type: none"> ➤ Assessment reports produced by the game ➤ Monitoring during game play
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What will learners need in order to achieve learning objectives?

Prerequisite	<ul style="list-style-type: none"> ➤ Basic English reading ➤ Basic computer use skills ➤ Basic English grammar (present simple, present continuous, past simple, future simple, conditional present)
Settings and materials	<ul style="list-style-type: none"> ➤ Computer lab with blackboard and one computer per student ➤ <i>Business Trip To London</i> game

What do I need for implementing the scenario?

Applications involved	Mandatory	<ul style="list-style-type: none"> ➤ <e-Adventure> ➤ E-mail account (to gather assessment reports)
	Optional	➤ One projector
Infrastructure/ equipment	Mandatory	<ul style="list-style-type: none"> ➤ Internet connection ➤ One computer per learner
	Optional	➤ One projector
Learning Resource Type	➤ Game (Interactive learning resource)	
Time / Space resources	➤ One 45 minutes lesson and 10-minutes for debriefing during the next session	

4.3. Check your design: Success factor for GBL

Within a previous study performed in *ProActive*, success factors for the construction of a good educational game have been identified. Three different dimensions have been pointed out, namely **gaming aspects**, **learning aspects** and **technical aspects**.



Figure 8: Three dimensions of the success factors in GBL

These factors should be taken into account for designing successful GBL scenarios. They are presented below as a checklist.

Gaming aspects

G1. Does the game present clear goals and objectives that the player will have to accomplish in order to complete the game?

The game should include final objectives, but might also have intermediate / short-term

goals in order to facilitate the player in reaching the final ones.

G2. Are the game's rules clear and consistent throughout the whole game?

G3. Is the challenge in the game appropriate?

Players should strive for continuous improvement. This can be achieved by increasing level of difficulty. However, the level of challenge should not surpass the level of possibilities, in order not to discourage the player.

G4. Is support and feedback accessible at the times likely to be needed?

Players should be able to perceive the impact and consequences that their actions have in the game world, in order to be informed about how they are performing, check their progress continuously, and enable them to eventually adjust their actions. Positive feedbacks are often associated with rewards, which help the player in the achievement of the objectives and acts as a mechanism to increase engagement and immersion.

G5. Will it hold the attention of all?

The game should be engaging, exciting and interesting for the wider possible number within the target group of students. This is achieved by using game elements like an interesting plot / story, an appealing environ-

ment / virtual world, contextualization, challenging goals, etc.

G6. *Does the **game experience vary from one player to another and between different game runs?***

Adaptability is often achieved by varying the challenge depending on the player's skills and knowledge.

G7. *Is the game **'replayable'**?*

The player should feel willing to play the game more than once.

G8. *Does the game scenario promote **"good" competition**?*

Competition could happen between peers (in multiplayer games) but could also be individual, through game scoring or ranking systems.

G9. *Does the game include elements oriented to make the games more **fun and entertaining**?*

It's important to verify that the game includes jokes, humor, or any other elements required to make it more fun. But be aware these elements will not suit every game! (Inaccuracies in content can be dramatic in educational settings).

Learning aspects

L1. *How well does the game fit with your **educational objectives**?*

L2. *Is the game adapted / **comprehensible** to the specific students' profile?*

Check that the contents, puzzles and language used are adequate for your students, taking into account aspects like age, skills, knowledge level, socio-cultural context, etc.

L3. *Does the scenario provide **relevant learning resources**, if necessary for achieving the educational objectives?*

It is highly recommended that you provide additional content to your students to reinforce learning. It could be provided as additional links, books, reading notes, etc., but also as content that is embedded in the game. These aspects should be considered from the beginning when the learning scenario is being designed.

L4. *Does the scenario consider an **adapted evaluation methodology**?*

In GBL, the rewards system could be adapted to evaluate the players' performance within the game.

L5. *Is the game **embedded in a comprehensive learning scenario**?*

The game should be included in a wider learning scenario which might include other learning activities, such as further discussion / reflection sessions in the classroom, group activities, reports, presentations, homework, etc.

L6. Does the game allow for a *progressive acquisition of knowledge*?

The level of challenge of the learning experience should be high enough to keep students engaged but without surpassing their abilities so they do not become frustrated.

L7. Does the game provide a *personalized learning process according to the students' profile*?

L8. Does the game provide a context in which the *level of autonomy of the learner is high*?

L9. Does the GBL scenario enhance students' *motivation*?

This aspect is difficult to check beforehand. However, when the GBL scenario is put into practice, it's important to verify if students are really more motivated; otherwise the scenario should be revised in the future.

Technical aspects

T1. Is the game *user friendly and easy to use*?

The player should concentrate on the objectives and not on dealing with a bad interface.

T2. How appropriate are the *graphics* for the target group?

For example, cartoon styles are appropriate for kids, while photo-realistic environments are better for teenagers or university students.

T3. Is the game *flexible and easy to adapt*?

It is desirable that the game could be reused in different contexts without the need of complex and costly modifications. Besides teachers could be interested in adapting the games produced by other teachers.

T4. Are students' computers capable enough to run the game?

If the scenario is situated in the school, check first that the organization's equipment meets the technical requirements of the game. If the students are supposed to play at home, you should check that students have an up-to-date computer and band-width Internet connection at home. This is especially important if 3D multi-player games are used.

5. Experiences using ProActive's Tools

5.1. A Case Study of EUTOPIA

EUTOPIA has been used in the past to train young professionals interested in improving their mediation skills and strategies (inter-cultural mediators, social affairs officers, police forces, lawyers, peace-workers etc.). Given the political and social impact of inter-community conflict this is an extremely important goal.

Three experiences were organized in three different regions of the European Union (Italy, Northern Ireland and Cyprus). Classes were created in three different conflict contexts: 1) an urban social conflict (Naples), 2) an urban social conflict coming from an international conflict (Belfast); 3) and an international conflict acting in the city area (Nicosia).

The training was based on a blended strategy, combining classroom learning with e-Learning based self-study. The sequence of activities was as follows:

1. Design of the simulation environment using EUTOPIA.
2. Training of tutors.
3. First face-to-face meeting, introducing the goals, contents, methodologies and tools

and finalizing the “learning agreement” with the participants

4. Remote simulations, using an on-line platform for synchronous group interactions in a virtual interaction environment.
5. Second follow-up face-to-face meeting for a final evaluation test.

Four remote sessions were scheduled: each one consisted of a simulation meeting and a follow-up meeting. Participants, divided in subgroups, simulated a conflict situation and the linked mediation process, supervised by their tutor. The system gave the tutor the chance to choose the "script" for the session.

All activities were followed by a tutor, who provided feedback on strategies and evaluated outcomes (how far the group achieved its own specific goals, how far it achieved the general goals of the exercise). Participants took part in synchronous sessions (together with the tutor) designed to simulate mediation with specific content and goals.

5.2. <e-Adventure> in practice

<e-Adventure> is not a general-purpose game editor, so it presents limitations. This is important to make the tool more accessible for educators. However, <e-Adventure> is versatile enough to develop puzzle and 2D adventure games.

Below three different <e-Adventure> games are presented, in the aim that they can inspire teachers in how to use the platform. In each case a description of the game is provided, along with a screenshot. Their relation to the 5 learning metaphors is also analyzed.

The Hematocrit (HCT) game

HCT is a 2D point-and-click simulation game, where students have to perform the procedure to measure the Hematocrit level in a blood sample. The goal is to reproduce the procedure as accurately as possible, just as they would do in the real laboratory. This game was used in real classroom settings with

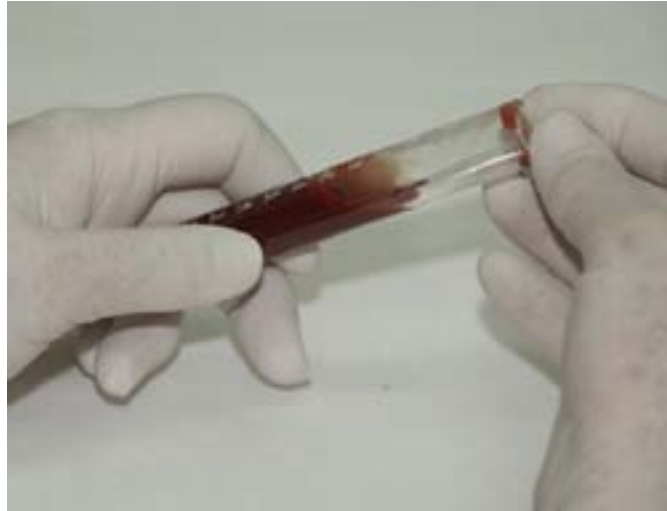


Figure 9. Screenshot of the HCT game

400 students from the School of Medicine at Complutense University of Madrid.

2D point-and-click simulation games are useful in providing students with safe test environments where they can reproduce real procedures or complex sequences of actions. The

plot that drives the game experience is defined by the own rules of the procedure. They are usually experienced in first person to enhance realism and immersion; that is, the player experiences the game world as being part of it. These games are composed with photos of real scenarios as realism is an

extremely desirable feature for these games.

Metaphors: Although all the games have flavors of the 5 metaphors, some are predominant in each kind of game. In 2D simulation games usually experimentation and imitation are common. Participation is limited all around <e-Adventure> since it is not multiplayer.



Parity

Parity is a game oriented to teach the concept of parity (odd/even) in an active way to 7-8 years-old children. The game has an immersive and fantastic plot where two turtles are the main characters: *Odd* and *Even*. Nonetheless, in order to complete the game the player must solve different **drag-and-drop puzzles** that are isolated and self-contained.

Parity is a good example of **puzzle games**. These games are composed of a set of different **puzzles/levels the player must complete**. Each puzzle or level can be seen as a different mini-game or scene. As the player progresses in the game, the difficulty of the puzzles usually increases. The puzzles can be embedded in a narrative plot or common story to increase engagement. For instance, <e-Adventure> could be used to develop puzzle-based games such as *Professor Layton and Pandora's Box*, where the players must complete different self-contained tests that are embedded into a single story in order to go on in the game, or games such as *Brain Training* where puzzles are just levels that are not connected at all.

Metaphors: In puzzle games like *Parity* **Imitation** is usually the more representative metaphor.

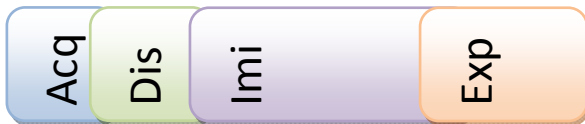


Figure 10. Screenshot of the Parity game.

1492

The **1492** game is a **third-person adventure game**. The goal of the game is to recreate the historical feats that occurred in Spain during the year 1492, when America was discovered by Cristobal Columbus. The real feats are immersed in a fantastic plot where a small child, Cristobalín, is the main character of the story, and the avatar that the player controls.

In **third-person adventure games** a strong **narrative plot** is the more important element. All the puzzles and quests that the player must solve in the game are directly related to the feats that compound the plot. **Fantasy** and an **immersive game world** are usually present in these games, which are experienced in third person (the player controls an avatar) most of the time. Characters are usually defined with strong personal traits.



Figure 11. Screenshot of the 1492 game.

Metaphors: In games like 1492 **Acquisition and Discovery** are usually the more representative metaphors.



Appendix: Guide to the Literature

General Literature on Game-Based Learning

The literature is populated with a lot of information about Game-Based Learning. Some of this information is **academic**, where researchers of the field discuss the potential, drawbacks and other considerations about Game-Based Learning.

Plenty of authors deserve to be mentioned in this category. However, we'd strongly recommend the next articles and essays by Thomas **Malone**, James P. **Gee** and Clark **Aldrich**. Malone was one of pioneers in analyzing what makes computer games fun and how these traits can be used to improve learning processes. However, this interest in games remained almost unnoticed until authors like Gee and Aldrich started advocating for the use of games with serious purposes:

- Malone, T. (1982). *What makes computer games fun?* SIGSOC Bulletin, 13(2-3), 143.
- Gee, J. P. (2003). *What video games have to teach us about learning and literacy*. New York: Palgrave Macmillan.
- Aldrich, C. (2004). *Simulations and the Future of Learning: An Innovative (and Per-*

haps Revolutionary) Approach to e-Learning. San Francisco, CA: Pfeiffer.

However, there are also other publications that are less formal and more **oriented to teachers and educators**. We recommend the Handbook produced by the European School-net project:

http://games.eun.org/upload/GIS_HANDBOOK_EN.PDF

Game Genres and Their Relation to Learning

If you want to explore in more detail game genres and their relation to learning, we recommend authors like **Amory** and **Dickey**:

- Amory, A., Naicker, K., Vincent, J., y Adams, C. (1999). *The use of computer games as an educational tool: Identification of appropriate game types and game elements*. British Journal of Educational Technology, 30(4), 311–321.
- Dickey, M.D. (2005). *Engaging by design: How engagement strategies in popular computer and video games can inform instructional design*. Educational Technology Research and Development, 53, 67-83.

Application of Games in Education

For practical studies in the use of games in education, we suggest reading the next reports:

- The Horizon Report 2011, p 20. The New Media Consortium:
<http://net.educause.edu/ir/library/pdf/HR2011.pdf>
- Teaching with games: Using commercial off-the-shelf computer games in formal education. Futurelab, 2006.
http://archive.futurelab.org.uk/resources/documents/project_reports/teaching_with_games/TWG_report.pdf
- Emerging trends in serious games and virtual worlds: Sara de Freitas, Becta, 2008:
http://open.jorum.ac.uk/xmlui/bitstream/handle/123456789/11703/data/downloads/defreitas_games_virtual_worlds.pdf

About the 5 Learning Metaphors

To learn more about the pedagogical background behind *ProActive*, you can read **Simons'** theory of the 5 learning metaphors:

- Simons, R.J. (2004). *Metaphors of learning at work and the role of ICT*. Workshop Learning and Technology at Work: London.
- Simons, R.J. & Ruijters, M.P.C (2003). *Differing colours of professional learning*. In L. Mason, S. Andreuzza, B. Arfè & L. Del

Favero (Eds.), Improving learning, fostering the will to learn. Proceedings Biennial Conference EARLI (pp. 31). Padua, Italy: Cooperativa Libraria Editrice Università di Padova.

- Simons, R.J. & Ruijters, M.P.C (2008). *Varieties of work-related learning*. International Journal of Educational Research, 47, 241-251.

Further reading on <e-Adventure>

For resources and information about <e-Adventure>, we encourage you to visit its official web-site: <http://e-adventure.e-ucm.es>, where information and resources are updated frequently.

We also recommend some selected publications in academic **journals**:

- Pablo Moreno-Ger, Javier Torrente, Julián Bustamante, Carmen Fernández-Galaz, Baltasar Fernández-Manjón, María Dolores Comas-Rengifo: *Application of a low-cost web-based simulation to improve students' practical skills in medical education*. Int. J. Med. Inform. Vol 79, pp. 459-467, (2010), doi:10.1016/j.ijmedinf.2010.01.017. Available online at: <http://dx.doi.org/10.1016/j.ijmedinf.2010.01.017>. 2010.

- Pablo Moreno-Ger, Daniel Burgos, Iván Martínez-Ortiz, José Luis Sierra, Baltasar Fernández-Manjón: *Educational Game Design for Online Education*. Computers in Human Behavior 24(6), 2530–2540. 2008.

//www.fridericana.it/schedanew.asp?isbn=9788883380884)

Further reading on EUTOPIA

Here you have also some references about EUTOPIA:

- Miglino, O., Di Ferdinando, A., Rega, A. & Ponticorvo, M. (2007). *Le nuove macchine per apprendere: simulazioni al computer, robot e videogiochi multi-utente*. Alcuni Prototipi. Sistemi Intelligenti, 19 (1), 113-136, ISSN: 1120-9550.
- Miglino, O., Delli Veneri, A., Di Ferdinando, A. & Benincasa, B. (2008). EUTOPIA-MT: *La Formazione alla Mediazione attraverso un Gioco di Ruolo* On-line. In Proceedings XIV edition of AIPñ sezione sperimentale , Padova.
- Miglino, O., Venditti, A., Delli Veneri, A. & Di Ferdinando, A. (2010). *"EUTOPIA. Teaching mediation skills using multiplayer online role-playing games"*. World Conference on Educational Sciences, Istanbul 4-8/2/2010.
- E-book: Delli Veneri, A. & Miglino, O. *"EUTOPIA-MT: conflict management through digital worlds"* (download version at



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