# PBL and Serious Games

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**Abstract**

First this communication reports an active learning experience about students who had to create Serious Games dedicated to teenagers. In the second time, this communication takes supports on the experience to highlight similarities between the PBL and Serious Games approaches.

**Key words:**
Active learning, PBL, Serious Game, Similarity, Video game.

## I    INTRODUCTION

In his article "From Visual Simulation to Virtual Reality to Games", Mike Zyda[11] proposes the following definition for Serious game: "A mental contest, played with a computer in accordance with specific rules, that uses entertainment to further government or corporate training, education, health, public policy, and strategic communication objectives." (p. 26) In other words, the vocation of Serious Game is to invite the user to interact with a data-processing application whose intention is to combine at the same time teaching, training, communication, or information aspects, with ludic mechanisms based on video game. The purpose of such an association is thus to give attractive shapes or plots (Game) to didactic contents (Serious).

The aim of this communication is to show similarities between the active learning approach PBL (Problem based learning) and Serious Games. We will illustrate our approach with a pedagogic experience led during one month in the shape of a PBL which subject was to create a Serious Game.
The goal of this work is to study the object Serious Game in order to merge it with PBL by combining their added values.

In the first part we will discover the great lines of the pedagogic experience, its targets and context. Further on, in the second part we will under-line the similarities in the paradigms of the active learning and those of Serious Games.

# II    DESCRIPTION OF THE PBL

## II.1 Objective of the project

Today according to several surveys and studies, in countries like Canada, France, USA… we know that young generations, between 12 to 24 years old, use more and more Internet and video games (Sauvé[7] (p.54-55)). The idea to communicate with this public by the means of Video Games seems thus to be a relevant paradigm. According to this, 30 students in multimedia at the IUT-SERECOM in Tarbes (A town located in the south of France) have been invited to realize a Game Project that delivers a message. Called «Serious Game», this kind of application with its game aspect designed as a serious intention, concerns in our case the pupils of the Secondary School in their final year of study. They are ready to leave the Secondary School and they have to make a decision concerning their future studies. The very idea is thus to help them to explore the professional world (Tricot[4]) by showing them in an attractive way trades that are unknown or fuzzy to them. When a Serious Game is aimed to contribute to a social aim, we identify it by the term "Edumarket Game" (Rampnoux & Alvarez[10]).

## II.2 Context of the project

The realization of this project consists of splitting up 30 Students into six groups of 5 students according to their affinities. To start, they have to find out a name of a company as well as its visual identity. These "companies" are then in competition and they have to answer to a false open tender. Every group has to hide their project until the final presentation and to beware of "industrial espionage"!
The customer, in reality the teacher, is free to deliver interesting ideas seen in different "societies" if there is no agreement of secret between the different societies being concerned.

In this spirit the students are invited to consider what follows: to take into account the initial specification of the budget, to negotiate it if necessary, to respect the dead lines and to share the different tasks of production. On the marketing plan, the tastes, the culture and the context of the public that is aimed, have to be identified and considered by a real contact by answering questions. Concerning the technical aspect, the students have to extend their knowledge in the field of the programming and the using of the software of production. Concerning the design, the students have essentially to concentrate on the concept of game design. They have to test games in order to analyze them and to elaborate a Gameplay concept, a coherent graphic and sound design associated to it, and to be assured of the balance between the aspects of game and education. To be sure of all that, once the paste-up being

achieved, they have to test it in a simplified way by the public that is concerned. At last, concerning the global conception, the students are advised to contact regularly "the customer" in order to determine the constraints of the project as well as possible and to obtain information which was not delivered initially (get to know the tastes of the customer, his approach, his context, his challenges....). Every appointment is followed by a discussion where the teacher gives his point of view and advices if necessary.

The different groups also have to write a management report in order to describe the principal steps of the realisation of their Serious Games. That will allow the students to consign the experiences of the group as well at a human level as at a technical level. This approach is meant to create a distance, which will allow the students to verbalize and to write down their knowledge and experiences (Sauvé[7] (p.60)).

The length of this project was about a month, knowing that the students had others projects besides to realize as well as their lessons.

Finally, the projects had to be submitted to the whole groups and teacher. Each group had to explain their work and the details of the specification, to present the paste-up of the Serious Game as well as the opinion of the pupils.

The paste-up, the specifications, the journal and the introduction are being marked. The average constitutes a total evaluation of the project. To put the different groups into competition is here useful for pedagogic reasons: It will assure for every group that shows its project, a new look by the other groups. This would allow constructive remarks and arguments based on different experiences. Thus all the students have the benefit of hindsight on their respective projects that would allow them to mobilize the new identified trainings.

## II.3 Assessment of the project

The students have managed to realise all the components (Specification, Paste-up of multimedia, Questionnaires, Journal and Presentation) in time. The students have shown a fine involvement in realizing the project. This has been underlined by the fact that other teachers giving traditional lessons have noticed a big absenteeism rate with these students. That has not been notified within the PLB. Finally, the acceptance of the teachers of the Secondary School having in charge to give lessons of professional discovery has been very good. Those one have found a concrete link between their program and the approach of the students coming along questioning the pupils of the Secondary School and introducing an unknown trade by showing the Paste-up of a Serious Game. A group of students has even been asked to talk about their studies in Multimedia. That is a real recursion!

Concerning the remarks done by the students, we will notify that they have often expressed the lack of time to realize the paste-up in accordance with their ambitions. Some students have also asked to understand during this experience the concrete

link between their future profession as a Multimedia conceptor and the PBL. It seemed to them much to play-like and too far from the classical lessons that they were usually following.

On the whole, even though a minor group of students are still sceptic to the approach, this experience has been conclusive. The PBL and the Serious Games can thus be combined on a pedagogical level. This result is thus in conformity with the works of Russell[2].

## III SIMILARITIES BETWEEN SERIOUS GAMES AND PBL

We have just described our pedagogical experience and we have realized that the active learning and the Serious Games are really compatible on an educational level. This compatibility depends perhaps on the presence of points in common that defines these two approaches? Let us now see if we can identify some of these similarities.

### III.1 Similarities identified at the design step of the Serious Game

At the conceptualization step of the Serious Game we note at least three similarities with the PBL.

In fact, the PBL invites the students to reach a fixed goal by their own experiences in order to make their own learning. This iterative approach is generally felt as pleasant by the participants, as that lies within the scope of a challenge to succeed. Thus, this is ludic (Raucent & Vander Borght[1]). At last, the whole of this learning is supervised by a mediator who organizes, observes and guides if it is necessary.

Concerning the Serious Games we will find similar aspects: To elaborate for example its gameplay, one passes by several tests and errors (This is similar to the iterative approach of the PBL). And this appreciation, asks, for sure, to play with this application and the others video games which must be studied too (That remembers us the ludic aspect of the PBL). Finally, the presence of one or several persons not being a part of the group of creation and making tests is necessary in order to get to know the weak and the strong points of the application (That is the same for the PBL with the presence of a mediator).

Thus the approach of PBL and the conception of a Serious Game seem to present three similarities at this stage:

- The iterative approach
- The presence of the ludic aspect
- The presence of a mediator

### III.2 Similarities identified at the use step of the Serious Game

Once the Serious Game has been finalized, its principle of use presents with the PBL the three similarities that we just have identified in the design step.

First, for the iterative aspect, the principle of play to video game is precisely based on this philosophy (Salen & Zimmerman[3]). Thus, the user can make again the same action several times or try various strategies until that he succeeds.

Then, we find again the ludic component that the PBL proposes by its challenge aspect as the game component of the Serious Games also does (Alvarez & Djaouti[6]).

Finally, the presence of a mediator is once again necessary to frame the pupils who use the Serious Game. Indeed, the designer of Serious Game can try to suggest to the user the attitude to adopt with its software, by making rules, sounds and graphics, the user always decides the final attitude that he wishes to adopt (Frasca[9]). Thus, he can choose to adopt an entirely ludic attitude and to occult the didactic aspect that the conceptor had envisaged initially. Thus, the presence of a mediator is very useful to guide the players, lead them in order to step backwards and maybe learn something new (Alvarez[5]). We will stay careful by saying that a mediator won't be an absolute guarantee to obtain totally and systematically all the targets that he have in charge.

### III.3 PBL and Serious Games, reflexive approaches

Moreover than the three similarities that we have just identified in the design and use steps there are other points in common between PBL and Serious Games.:

For instance, it is amusing to see that the PBL as well as the Serious Games have to prove to a great number of persons and teachers its educational contribution as well as their added values. In the two cases, they invite the teacher in charge to become an organizer of activities and they are a challenge to the classic lessons (Raucent & Vander Borght[1]).

This will lead us to ask questions about the valuations. The PBL as well as the Serious Games have to find adapted systems of valuations. In fact, both approaches refer to personal approaches that cannot be evaluated in the same way as an ordinary questionnaire. (Dahlen[8]; Raucent & Vander Borght[1]). The evaluation here expounded, involves as well a short term as a long one.

At last, we will add that the target of PBL and the Serious Games are there to give an answer to a generation with an eagerness of interactivity (Dahlen[8]). There are surely other points in common. This series of findings is not exhaustive.

However, the similarities are at this stage, already enough many and explicit to plan to study the recursivity crossed between these two approaches.

# IV  CONCLUSION

During this communication, we have first seen, that the pedagogical experience that combines the PBL and the Serious Games present conclusive results concerning the involvement of the students (a very low rate of absenteeism) and that the targets that were fixed have been fulfilled (All the documents asked for have been presented in time as well as a good reception of the set-ups by the pupils.) We have thus deduced that the PBL and the Serious Games were perfectly well adjusted to each other.

Starting from this conclusion, we have found six similarities, not exhaustive, between the PBL and the Serious Games. These  common points concern as well their pedagogical approach as their questions.
All this will allow us to conclude that it is possible to study the crossed recursivity of these two approaches in order to understand them better and eventually optimize their relationship.

We will study in our further works more deeply the component  of "The presence of a Mediator" that we have identified in the chapter III.1. The goal will be to try to analyze the influence of the mediator on the students in the context of a disposal combining the PBL and the Serious Game. These data will then eventually allow us to better implement a virtual mediator within a Serious Game.

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