

A 3 Roles' Model to Better Design and Facilitate the Use of Serious Games in the Classroom

Valérie Sallaz¹ and Thibault Carron²

¹Université Savoie Mont-Blanc, IREGÉ, France

²Sorbonne Université, CNRS, LIP6, France

valerie.sallaz@univ-fr

thibault.carron@lip6.fr

Abstract: The use of serious games in education, whatever the level of students and the subject of study, is full of promise but also strewn with obstacles. Both aspects have been the subject of numerous studies, a number of which underscore the multiple roles teachers have to embrace, each of them representing a more or less difficult challenge. Many factors come into play, including teachers' familiarity with this particular kind of tools.-The research work presented in this article includes both game designers and university teachers in the field of management. Serious games have been used in classroom during a 6-year experiment. This experiment reveals a set of teacher attitudes that have to be adopted during teaching sessions to make the most of an increased students' engagement. Teachers are led to adopt roles and positions they are not always familiar with, which can lead to certain difficulties or frustrations. How can we better take these new roles into account? Is it possible to turn them into a strength, and to take them into consideration beforehand, when designing teaching sessions, so as to optimize the use of serious games and get the most benefit from them? Finally, we propose to build a grid of these roles, which describes each of them, its benefits and its limits, and provides guidelines to avoid common pitfalls.

Keywords: Teacher roles, Serious games in the classroom, Management simulation, Game master

1. Introduction

Some teachers embark on the use of serious games in the classroom having in mind the benefits often associated with the approach. At the very least, this modality is considered to have a positive impact on both rhythm and variety of the course. Most importantly, it engages students, motivates them, and, in fact, promotes learning.

But this approach also implies changes in their role that teachers do not necessarily anticipate. They often devote most of their time and commitment to technical implementation and discovery of the serious game, to the detriment of a thorough reflection on the course of the session. It is only when the actual course takes place that teachers realize, more or less implicitly, the emergence of new relationship patterns between them, the serious game and the students. They discover that they must adapt their stance to account for this specific scheme, in order to avoid certain pitfalls and make the most of the situations.

We found it important to explicit these schemes and the (sometimes new) roles that teachers need to play in each of them. These roles have been the subject of several studies, in which teachers have been requested to point them out by themselves after having used serious games. We propose a methodology to help teachers do so beforehand, and take these new roles into account in the very process of designing their sessions.

The question we ask is therefore the following: can teachers reverse this experience and define in advance the roles they will have to play? Could this be a way for them to not only better master these roles, but also to make them a tool for designing the session, in order to get the best out of the use of the serious game?

In chapter 2 of this article, we will study the state of the art on teacher's role in serious-game assisted pedagogy. Chapter 3 will present our proposal by describing each role. The fourth part will focus on the implementation and application of this model to a serious game that has been used for 6 years, and its results based on questionnaires submitted to the protagonists. The last chapter will be dedicated to discussion and conclusion about this work.

2. State of the art

Our research focuses on the roles played by teachers in the use of serious games.

Different roles can be played by teachers when using serious games in the classroom. The technical and administrative environment alone can be a major obstacle, because it requires specific skills that the teacher does not necessarily possess, as well as a significant amount of time and involvement.

Two research articles address the issue from the perspective of the kind of support to be given to teachers adopting serious games.

The first one, titled « Supporting Teachers in the Process of Adoption of Game Based Learning Pedagogy” (Emin-Martinez & Ney, 2013) wonders how “*the adoption process unfold when teachers introduce games in their classes for the first time?*”. The article describes the different stages that lead the teacher to adopt the use of Serious Games as an innovation. The second one (Wolfgang G., 2016) lists points “*which all institutions have to go through for successful implementation*”.

These articles confirm that different kinds of obstacles can be encountered on the teacher's path.

Beyond these aspects, the mere use of a serious game in the classroom also requires teachers to adapt to new situations for which they must be prepared.

Three articles focus specifically on the role of the teacher during the use of serious games in the classroom.

In “Teacher Roles and Positionings in Relation to Educational Games” (2010), (Hanghøj and Brund define three pedagogical approaches with different roles played. Four roles are specifically interesting in our context.

- Instructor: “teachers attempt to plan and communicate the overall goals of a game scenario in relation to particular learning objectives”
- Playmaker: “teachers’ ability to communicate the tasks, roles, goals, and dynamics of a particular game scenario as seen from a player perspective”
- Guide: “how teachers support or scaffold students in their attempts to meet particular learning objectives when they play a game”
- Explorer: “understand, evaluate and provide dialogical response to the students” experience of playing a game – as seen from an outsider’s perspective”

We agree with the above authors on the observation that the different teacher's roles all include constant interaction: “*teacher roles should not be seen as fixed “scripts” or functions, but rather understood as more or less stable patterns of interaction and expectations that are based upon processes of continual negotiation – i.e. between a teacher, a game scenario, and his or her students*”. The **Instructor** role is core to any teacher’s practice and therefore not specific to the context of serious-game based pedagogy. It is nonetheless fundamental.

The three other roles describe in detail how the teacher establishes the link between students and the game, and supports them during their game experience. In our opinion, this distinction is not required and these roles could be regrouped under a unique term corresponding to a “**Game Master**” function.

(Molin G., 2017) offers an overview of the research conducted on the issue of roles, and concludes that “*the role of the teacher in game-based learning needs to be crucial as well, which also means that game-based learning could be an opportunity to empower teaching and to create new meanings of the role of teacher in the digital age*”.

In particular, it mentions the different roles documented by (Silseth, 2012) and summarized by (Shah and Foster, 2015):

- Expert: “help students making connections with the learning goals.”
- Facilitator: “facilitator of pedagogical approaches such as instruction, discussion and observation to provide space for reflection and feedback”
- Connector: “to help students to see and understand the relevance of their acquired knowledge beyond the classroom”

The **Expert** role is obviously key, in any teaching context. Nonetheless, we consider that the Facilitator and Connector roles could be seen as part of this expert role, or at least directly associated with it.

(Marklund and Taylor, 2015), describes a several months study identifying teacher’s roles along the learning process: “*The study identifies the different roles that a teacher takes on throughout game-based learning processes, such as technical administrator, game administrator, game tutor, subject matter expert, lecturer, debriefer, and classroom supervisor*”.

In this article, we retain a specific point of view about in-class facilitation, which highlights the necessity of a better context understanding in order to improve the use of these games in the educational system.

In confirmation of this conclusion, our own findings point out three following behaviours:

- Game tutoring: guide and support students’ gaming experiences during gaming activities
- Authority & enforcement: help reinforce the educational framing of the gaming activity.

- Anchoring on the subject: bridge the gap between game content and the details of the subject matter the game is intended to illustrate.

Similarities appear between the description of these roles and a few others that we have already mentioned, with only a change of perspective. The "game tutor" corresponds to one aspect of the Game Master role and anchoring can be seen as more specifically attached to the Expert role.

A last article does not focus on the use of the serious game but in a general way on learning postures (the authors use this name instead of role), "Teaching skills: a multi-agenda of embedded concerns, a set of dynamic interactions between teacher's scaffolding postures and pupils' learning ones" (Dominique Bucheton & Yves Soulé, 2009). This article identifies 5 central concerns from a "teaching skills point of view":

- pilot and organize the progress of the lesson,
- maintain a space for language and cognitive work and collaboration,
- to make sense of what is going on,
- supporting the work in progress, itself described by "supporting postures".
- all with a focus on learning of any kind.

As mentioned, the fourth behavior is close to our concerns about the "posture" concept and four corresponding or expected behaviors:

- a controlling stance: by closely monitoring the progress of the tasks, the teacher tries to get the whole group to move forward in synchrony.
- a counter-supporting posture: the teacher, in order to move forward more quickly, if necessary, can go so far as to do things in the pupil's place.
- an accompanying posture: the teacher brings, in a lateral way, a punctual help,
- a letting-go posture: the teacher assigns responsibility for their work to the pupils and authorizes them to experiment with the paths they choose.

We do not take up any of these roles directly, but their definition, in particular that of "supporting postures", seems to make sense for our purpose and will help define a model, even if it was not intended specifically for a serious game context.

In summary, this state of the art analysis demonstrates that some of these roles overlap, and the proposed taxonomies vary according to the points of view, but they all converge on the missions that the teacher must fulfil:

- communicating the tasks and objectives to be fulfilled,
- assisting students to achieve them,
- maintaining a learning environment,
- creating links between the game and learning objectives.

The 3 roles that we describe in the next section account for all of these missions, while offering both a synthesis and additional dimensions.

3. A 3-Roles Model Proposal

The state of the art shows us that the roles identified allow for a detailed analysis of the way in which the teacher positions himself in order to create links between the learning object and the serious game (Wake, Dysthe & Mjelstad, 2007). In other words, it is the pedagogical dimension that is at the heart of the topic.

However, these contributions seem to be missing a mission that, on the contrary, appears essential to us when using a serious game: offering a genuine game experience to students. The implicit contract established as soon as the word "game" is used must be respected, and the game can't do it alone.

As we will point out in the next section, direct observations and students answers to our surveys show it well: the commitment generated by serious games is real, but the links with learning must be woven and closely held by the teacher.

This is why, at the end of this analysis and in the light of our experimentation, we propose to retain only 3 essential roles that we identify and describe in the next section. From our point of view, and in our research context, including recent or new "Serious Game adopters", it is important to propose a clear and simple model.

These 3 roles are always at play. Bearing them in mind from course-design stage and at all times during learning sessions can empower teachers with useful references.

The first fundamental role we want to put forward is specific to a mission that we will call the “**Pilot**”. The next one corresponds to the “**Expert**” and the last one has been called the “**Game Master**”.

3.1 The Pilot Structures The Session and Ensures That it Runs Smoothly

The Pilot’s role is to set up and maintain the learning framework, i.e.: plan and implement the session structure, define detailed processes for each sequence, end instructions to be communicated to learners. It covers everything from designing the outline to precisely shaping the thread of the learning session, while ensuring a fully controlled use of the serious game and a clear perception of its learning function.

In other words, the serious game must find its place in the learning session in a fluid manner, and its role as a learning tool must be perceived and understood by the students. In our model, the "authority and execution" mission put forth in the above state-of-the-art analysis, is also part of the Pilot’s role.

3.2 The Expert Makes the Connection Between Game Experience and Learning

The serious game cannot be the only vector of knowledge, know-how or soft skills defined as objects of learning. The teacher is also responsible for creating links between the game experience and the targeted educational objectives. Here again, the methods and time allocated to this work must be thought out in advance. The difficulty in using a serious game is to give the "right" place to this expert role.

The objective is to use the game experience to make the knowledge acquired from the serious game visible and valuable, and to use it as a basis for further study of the subjects covered.

3.3 The Game Master Provides a Playful Experience For Students

One of the proven advantages of serious games is their ability to engage students. In turn, this requires that the playful dimension of the tool be fully exploited. Specific questioning and facilitation mode choices have to be made by the teacher beforehand.

The challenge is to set up a genuinely entertaining experience for the students, while aiming at "serious" objectives at the same time.

Among all missions, this one is certainly the most field-specific, therefore unfamiliar to the teacher and potentially delicate to carry out. It is also the one that can be sized differently according to the teacher's level of mastery of the serious game.

Based on our experiment, we observed that these three roles are interrelated, which makes them contribute equally to the overall objective. Therefore, the teacher must keep them in mind simultaneously at all times, give them the same importance, and address the questions associated with each of them in advance. This is the only way to better master the use of the tool, to benefit from game playfulness and a higher commitment of students, and thus to get the most out of it in terms of learning.

3.4 The Guidelines

The following table is a suggested guideline for implementing these three roles. For each role, it includes:

- sample questions to be asked beforehand
- recommendations and suggestions for implementation

The PILOT
This list of questions and recommendations constitutes the essential basis for implementing a serious game in the classroom.
What questions to ask? - How do I keep control of timing? What timing constraints does the game impose on me? - How to articulate times of play with periods of transmission / in-depth study of considered knowledge? Can playtime easily be divided into self-contained sections? - Can a progression curve be set up for structuring the session? Does the game also feature a level-up experience?

What are the best practices to rely on?

Before the session:

- Test the game to master its structure: minimum duration, maximum duration, key stages, replay possibilities, risk of losing, ease of winning... Your objective is not to extensively explore its content, but to clearly understand how to use it and when.
- On this basis, plan the session structure by anticipating anchoring times. If the game allows, plan to alternate game and anchoring times.
- Try to figure out the reasons of technical constraints encountered in the game; try to estimate the benefit versus time spent and risk of difficulties or failure ratio you might face, and free yourself from these constraints if possible. In other words, focus on simplicity and fluidity.

During the session:

- Clearly and precisely establish expected result of each sequence of play, and condition for stopping, continuing or repeating.
- Formulate resulting instructions.

The EXPERT

This is the keystone role played by the teacher, who must above all ask themselves what they expect from the serious game in terms of learning. This analysis will later help calibrating how they invest in the Game Master role (see next table).

What questions should I ask?

- What are my learning expectations?

A recreation, a simple playful way to illustrate a topic?

A stimulus, a way to introduce a topic?

A basis for debate?

A transmission of knowledge?

An evaluation tool?...

- What game elements are in direct relation to my learning goals? What can I expect from the game in terms of learning?
- Are these elements explicit in the game or do they have to be inferred?

What are the best practices to rely on?

- Identify the direct links that can be established between the learning object and the serious game.
- Calibrate this identification work with your expectations
- Adapt the instructions to your expectations and draw up a clear contract with students: the higher the educational expectations, the more precise and demanding the instructions should be.
- Express the instructions before the game experience so that students keep a fresh memory of them while playing and do not risk to get confused.
- ... while ensuring that they do not turn the game experience into work:
allow for the possibility of playing twice,
or allow time for reflection after the game.
- Solicit the students' critical thinking: instruct them to synthesize, question, comment on, criticize... the serious game in order to exploit it, including its limits and weaknesses
- Encourage and exploit exchanges:
during game time if students are divided in subgroups
during full class working time

The GAME MASTER

This role is likely to vary largely depending on the teacher's familiarity with the serious game and their ability to use it.

The teacher should objectively position themselves on an axis graduated from Basically Trained User to Experienced Game Master, according to their experience, motivation, rehearsal effort they will need to invest to master facilitation, support they have access to.

It is a choice that they must make consciously, with the aim of benefiting from the serious game in all cases.

What questions should I ask?

- What exactly do I need to know about the game to achieve my goals?

Knowing the model on which the serious game is based is not a matter of necessity, but it will give the teacher more leeway and ease in dealing with unexpected events and student questions. It is therefore a matter of calibrating the level of mastery of the serious game according to what is expected of it.

- Do I know precisely the rules of the game and its gameplay?
- Can I change them?
- Are there particular points I want to draw the students' attention on?
- How can I get the students to play? Does the game impose a unique starting point, or does it allow for open possibilities that I can build upon?

What are the best practices to rely on?

Before the session:

- Imagine all possible modalities: individual, subgroup or full class game teams
- Consider their resonance with the identified expectations
- If the game breakdown allows and if the session is long, try to vary modalities over time to avoid repetition or boredom.
- Include times fully dedicated to a free experience of playing, during which students may act and behave at will.

During the session:

Adopt a clear position towards the serious game:

Depending on the field taught, warn that the serious game is not an expert, and should rather be seen as an opportunity to provoke debate.

Generally speaking, explain the role that the serious game will play in learning.

If necessary, inform students about the difference between the level of difficulty of the serious game itself and the level of mastery expected from them.

During independent play time:

Clearly state beforehand the instructions to be followed and the condition for stopping.

Do not intervene during play time, except at the request of the students.

Dissociate the game from the pedagogical issue (winning is not necessarily the best way to learn):

Let students seek to win and be satisfied with having done so but offer related goals to encourage them to explore and test different strategies if the game allows.

As part of your facilitation strategy, take advantage the elements provided in the serious game that refer directly to the game universe: scores, rankings, objectives to be fulfilled, life/action points...

4. Use case: A 6-year Experiment

4.1 Description

Over the last 6 years, the same experimentation has been repeatedly carried out and progressively enriched. It consisted in taking 3 serious games dedicated to managerial situations as a central part of 2 tutorial sessions.

One the games was based on remote-management challenges, the second one dealt with conflict management, and the third one with the subtleties of giving feedback.

- The “Remote management” game provides 3 successive missions. The learner-player is provided with action criteria like rhythm and content of meetings, level of feedback, mutual aid, reporting... each setting impacting the efficiency and cohesion of the team. The level of difficulty increases across missions, and each successive mission must be completed in order to access the next.
- The “Conflict management” game focuses on an interview between a disgruntled employee and her manager. This time, it is about steering the dialogue by orienting a virtual manager’s attitude towards more or less sympathy, empathy or antipathy (authoritarian attitude) over the employee. Possible outcomes of the dialogue range from fully breaking up to perfectly restoring the manager-employee relationship.
- The “Feedback” game challenges the player with accurately qualifying the way a positive feedback is given (tone, precision, listening), and then conducting a dialogue to build corrective feedback (using the same principle as above).

Some preliminary elements:

- For these two sessions, from the first year, the choice was made to simplify the technical aspects as much as possible:
- A standalone version of the serious game is available to overcome any connection difficulties. No feedback or centralization of scores or progress is set up. Everything takes place during sessions, limiting preparations and follow-up as much as possible.
- We have deliberately excluded individual use of the serious games from the beginning of the experiment.
- The scores obtained within the serious games were explicitly and totally disconnected from the teaching and its evaluation. The goal is for learners to freely test all strategies, including the worst ones.

Different modalities have been tested during over the years, but a same set of modalities was systematically implemented across all groups concerned during a specific school year, i.e., about 150 students per year.

Here is a summary of the pedagogical modalities we have implemented. For each of them, we have indicated 1 or 2 of the 3 roles that predominate.

Collective play	
The group collectively plays simulation (conflict management): the teacher specifies that they do not expect a “good” answer, but a reasoned position. They provoke and lead debates, without ever taking a position. The class ends up voting and validating the choice of the greatest number.	
Roles of the teacher	<p>1 – Pilot: they distribute the groups, decide when to vote, ensure the timing.</p> <p>2 - Expert: they take every opportunity to provide clarifications and create links between what the course of events and notions to acquire.</p>

Play in pairs with instructions	
The students are grouped in pairs and play independently: they aim at fulfilling the mission assigned to them by the game, but also at following a precise pedagogical instruction (note key actions, raise points of disagreement, etc.). The teacher states this instruction and ensures that it is not forgotten during the game sequence.	
Roles of the teacher	<p>1 – Pilot: ensures that students move forward in the game, that they have understood and retained the instruction, and responds to any request they may have</p> <p>2 - Game Master: lets students make the most of the game experience while observing their progress and taking advantage of each of their requests or idle times to revive them, encourage them to test other strategies, etc.</p>

Free pair play	
Again in pairs, students play in fully free mode: they test strategies, make random choices, in other words they explore. The teacher directs their missions if they deem it appropriate (for example, a buddy who would have quickly completed the missions is invited to start again by seeking to obtain the worst possible score), and above all they answer questions and comments, which are usually flowing.	
Roles of the teacher	1 - Game Master: becomes the priority in this modality. The freedom of play granted to the group is predominant.

Collective debrief	
Group debriefing at the end of the game is conducted in pairs: general questions are asked, such as "What stands out in your mind?", "What did you think was important?", "Surprising?" ... If a specific instruction was given for the sequence in pairs, it is specifically addressed during the debriefing sequence. Every idea or opinion expressed by students is picked up on by the teacher to create links between the serious game experience and the knowledge to be transmitted, and to deepen related notions.	
Roles of the teacher	1 - Expert: it is above all a question of providing knowledge 2 - Pilot: makes sure that this debrief takes place in a lively and interactive way

Theoretical presentation	
The teacher presents concepts: theoretical notions that were implemented in the game session are exposed. This is a traditional class session, during which the teacher transmits knowledge by illustrating it whenever possible with examples from the serious game.	
Roles of the teacher	1 - Expert: it is exclusively a question of providing knowledge, in a traditional scheme

Over time, we have gradually built the good practices listed in section 3. We based ourselves on our observation of the behavior of the groups, in particular their involvement in the different sequences, and the richness of their exchanges during the debrief sequences.

Here are the main points that we were able to observe in a systematic way:

- The level of interaction is high: between students and the game, between students themselves, and between students and teacher.
- The variety of formats makes it possible to transmit educational messages in several complementary ways: via instructions, facilitation, dialogues, feedback, debrief...
- Exploitation of gameplay (missions, objectives, difficulty levels, challenges, score...) values and legitimizes the use of serious games. The more students feel like they are playing, the more they get involved and enjoy it.
- However, if they are not given explicit instructions for a learning objective, they focus exclusively on achieving the highest possible score.
- Traditional course sequences are perceived in stark contrast with game sequences, and it is difficult to maintain their connection and fluidity.

We supplemented this observation with two questionnaires. The first one was used over 4 years and allowed us to identify the students' feelings about serious games. We then focused our questions on how they perceive the role of the teacher during these sessions. It is this second questionnaire that is of particular interest to us here.

4.2 Evaluation

We will just extract one point from the first questionnaire: more than 80% of students "agree" or "completely agree" with the three statements "The serious game makes the course more pleasant (1), lively (2), and modern (3)".

At the very least, this result is an encouragement for teachers to persevere in their use of serious games in the classroom.

Here is the information we have retained from the 2nd questionnaire:

1 - Role of the teacher

It is globally: the same as in class (1), different from the one they have in class (2), it depends on the sequences (3).

The 85% of students' responses are evenly divided between answers 2 and 3. Very few consider that the teacher's role is the same as in class.

2 - Collective game sequence

The teacher transmitted knowledge to you: based on the game (1), without any real link with the game (2), did not transmit any knowledge (3).

(1) received 92% of the votes. The transmission of knowledge during the simulation is well perceived, as well as the link with the game.

3 - Link between theoretical presentation and serious game

The lecture that followed the simulation: was not really related to the SG (1), talked about the same thing but not related (2), talked about the same thing and made the subject clearer thanks to the SG (3).

(3) was chosen by 81% of students. Again, the link between the game and the knowledge imparted is well woven.

4 - Perception of the different sequences

Students were asked to choose the sequences they appreciated the most, in terms of learning on the one hand, and pleasure of use on the other.

The 2 modalities at the top of the students' answers are the realization of the first serious Game in subgroups, and the simulation played collectively.

The vast majority of students rank the games that they learned the most from and the ones they preferred in the same way. This tends to show that they equate pleasure and learning.

5. Discussion and Conclusion

In this article, we proposed a 3-role model to describe the teaching attitudes that a teacher should be aware of and adopt during a serious game session in the classroom. Our goal is to help them by identifying a priori the roles they have to play: Pilot, Expert and Game Master. We have chosen to focus our reflection on the roles that the teacher plays when running a session.

The list of roles that we propose is deliberately reduced, to make it easier for teachers to use it as a guide.

Our second concern in the construction of our proposal was to put forward the playful dimension of the serious game. Our experience has shown us to what extent the term "serious game" can raise expectations (from students), fears (from teachers), and frustrations (from both). We therefore propose to take into account this implicit promise of the term "serious game" in the identification of teacher's roles.

This is why we distinguish between a role of "Expert", focused on learning, and a role of "Game Master", focused on the game experience. In the description of the Game Master role, we consider the way teachers can dimension their investment. The third role we identify is the Pilot, committed to maintaining control over the course of the session.

In conclusion, we aim at providing teachers with a guide that will enable them to get the most out of the use of serious games, while providing students with a real game experience.

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