Electronic Journal of Research in Educational Psychology
ejrep
EDUCATION & PSYCHOLOGY I+D+i
Ilustre Colegio Oficial de Psicología de Andalucía Oriental

Video games as tools for change: A study based on Activity Theory

Laura Méndez[1] **& Pilar Lacasa**[2]

[1] Departamento de Psicología Evolutiva y de la Educación, Universidad Nacional de Educación a Distancia (UNED) Madrid.
[2] Departamento de Comunicación, Universidad de Alcalá, Madrid

Spain

Correspondence: Laura Méndez Zaballos. UNED. Facultad de Psicologia. C/ Juan del Rosal, nº 10, 28040. Madrid. Spain. E-mail: lmendez@psi.uned.es

Abstract

Introduction. The purpose of this study is to provide a framework for analysis from which to interpret the transformations that take place, as perceived by the participants, when commercial video games are used in the classroom. We will show how Activity Theory (AT) is able to explain and interpret these changes.

Method. Case studies are presented, using a qualitative, ethnographic approach. These studies explore the transformations that take place in a secondary school resource room, when we introduce the Sim3 video game. Participating in the studies were the special education teacher and two groups of students with special educational needs (12-16 years old).

Results. Video games, as mediational instruments, introduce practices, codes and languages into the classroom that provoke tension between elements of the system (the object of the activity, the relationship and role of community participants, outcomes of the activity and the rules of organization). Overcoming these tensions has involved transforming the resource room into a new, more facilitative system in order to respond to the special educational needs of students.

Discussion. This study presents a framework for analysis, based on Activity Theory, that provides certain keys to interpreting the scholastic role of technological instruments, such as the video game: the importance of looking outside the classroom to other systems to which it is connected; viewing the video game as a cultural object that introduces new practices which come into conflict with the practices of teachers and students in a traditional classroom; and finally, focusing the analysis on the many perspectives and 'voices' of the participants and on how their interpretations, beliefs and conceptions, are fundamental to change.

Keywords: video games, Activity Theory, educational change, special education.

Received: 09.14.15 *Initial acceptance: 10.15.15* *Final acceptance: 06.21.15*

Los videojuegos, herramientas para el cambio. Un estudio desde la teoría de la actividad

Resumen

Introducción. El propósito de este trabajo es ofrecer un marco de análisis para interpretar, desde la perspectiva de los participantes, las trasformaciones que ocurren en un aula cuando utilizamos videojuegos comerciales. Mostraremos cómo la teoría de la actividad (AT) permite explicar e interpretar estos cambios.

Método. Se presenta un estudio de casos, desde un enfoque cualitativo y etnográfico, en el que exploramos las trasformaciones que tienen lugar en un aula de apoyo de un instituto de secundaria, cuando introducimos el videojuego Sim3. Los participantes son la profesora de apoyo y dos grupos de estudiantes con necesidades educativas especiales (12-16 años).

Resultados. El videojuego, como instrumento mediador, introduce en el aula prácticas, códigos y lenguajes que provocan tensiones en los elementos del sistema (el objeto de la actividad, la relación y papel de los participantes en la comunidad, los resultados de la actividad y las reglas que las organizan). La superación de estas tensiones ha supuesto la trasformación del aula de apoyo en un sistema nuevo y más facilitador para dar respuesta a las necesidades educativas especiales de los estudiantes.

Discusión. Este estudio presenta un marco para el análisis, que partiendo de la teoría de la actividad, ofrece algunas claves para interpretar el papel de instrumentos tecnológicos, como el videojuego, en la escuela: la importancia de trascender el aula para fijarnos en otros sistemas con los que está vinculada, la necesidad de contemplar el videojuego como objeto cultural, a través del que se introducen nuevas prácticas que entran en contradicción con las que, profesores y estudiantes, llevan a cabo en las aulas tradicionales, y finalmente, la importancia de centrar el análisis en las múltiples perspectivas y "voces" de los participantes y en cómo sus interpretaciones, creencias y concepciones, están en la base del cambio.

Palabras Clave: videojuegos, teoría de la actividad, cambio educativo, educación especial

Recibido: 13/09/14 *Aceptación Inicial: 15/10/15* *Aceptación final: 21/06/15*

Introduction

The purpose of this study is to provide a framework of analysis from which to interpret the transformations that take place in the classroom, from the participants' perspective, when commercial video games are used as an educational resource. We will show how Activity Theory (AT) is able to explain and interpret these changes. From this conceptual framework, we look on the activity pursued by students and teachers as a system oriented toward a group objective, mediated by culture and characterized by conflicts (or systemic tensions) that constitute a pathway for development and lead to innovation and change (Engestrom, 2001). This theoretical model offers a very interesting conceptual basis for analyzing scenarios where traditional instruments coexist with new technological devices. It allows us to examine the transformation process triggered by tensions arising from the interaction of systems that share the same purpose, for example, the traditional classroom and a classroom where video games (typical of informal contexts) have been introduced.

Taking this model and recent studies as our reference (Fujioka, 2014; Joy & Murphy, 2012; Larripa & Euasquin 2010), the objective of this article is to analyze the tensions produced by introducing a typical practice from youth entertainment (the video game) into a formal context, and how these tensions have transformed the different elements of the classroom that together make up the activity system: the purpose of the activity, participants' goals, role distribution, the rules and norms that define the activity and the role of mediational instruments, especially the video game.

Activity Theory, our model for analysis

The idea of technology as a vehicle for transforming the teaching-learning process has been foundational to some of our earlier studies (Lacasa, Méndez, & Martínez, 2008; Monjelat & Méndez, 2012). We were able to verify how technology, namely video games, were not only useful for skill development, but they became a transformational element in educational settings, including contexts intended for special needs students. This discovery led to several questions: what had brought about this transformation? could the mere presence of new mechanisms trigger change? Furthermore, results from these studies gave evidence of tensions between how participants interpreted the experience, the role that they assign to technology, and the relationships established within the community, when new mediational instruments are used. This reality led to new questions: what role do these tensions play in

transforming the scenario? do conflicts prompt the creation of innovative scenarios that respond to the needs of all students?

Attempting to answer these questions led us to Activity Theory (AT), which emerges from the historical-cultural theory and Leontiev's hierarchical structure of human activity (Leontiev, 1978). This theory interprets human activity as a system defined by those "spaces" where people acquire the patterns of the community through group activities with a complex mediational structure. According to Leontiev, human activity is motivated by the need to transform an "object", which may be material or ideal (a problem or an idea). This motive guides the actions of subjects (individuals or groups) toward a specific goal, using tools that are typical of their culture.

This triadic model (subject-tool-object) was expanded by Engestrom (2001) into what he himself called third-generation AT, characterized by the importance of joint activity vs. individual activity, and to integration and dialectic interaction between all the elements that make up the system.

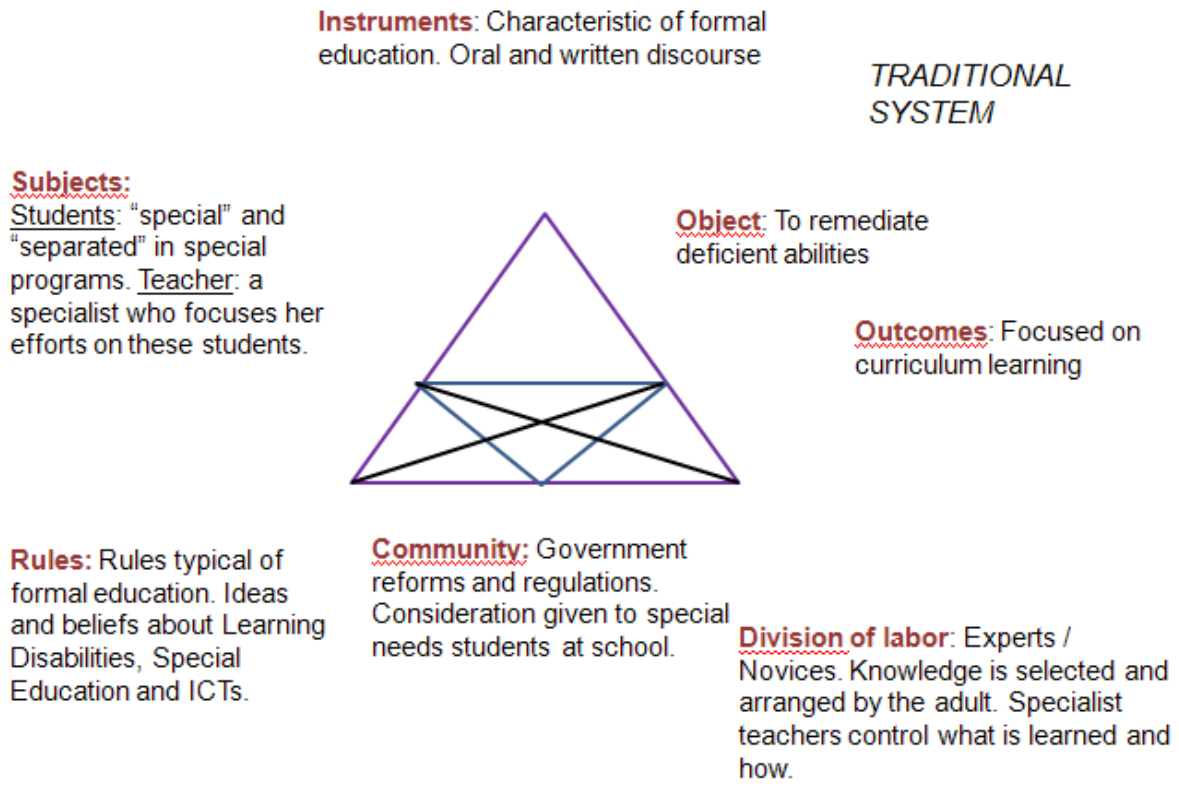

Figure 1. **The classroom as an activity system (adapted from Engestrom, 2001)**

This structure enables us to explain the activity that is carried out in the classroom as an activity system. More specifically, we focus our attention on its application to a resource room. Each of the elements represented in the diagram (Figure 1) occupy a place in the structure. The term subject refers to the students with special needs and to the teachers within the community who are assigned to teach them. The community is made up of a specific school's teaching faculty, or of the entire educational community, according to government regulations that define a given country's educational structure (in this case, the guidelines that define support for special needs students). The term division of labor refers to both horizontal relations between members and to vertical, power relations. In our case, these relationships are defined by student characteristics and by the passive role that they have traditionally been assigned. The rules interact with explicit and implicit norms and conventions that regulate actions and interactions within the community, having to do with ideas about how these students learn and are taught, and about the different means and methods used, including the use of ICTs. Finally, instruments or tools that are used in the resource rooms are defined historically and culturally. Thus, the history and tradition of Special Education is that oral and written texts are the most widely used instrument, while other instruments and languages are almost completely absent.

This model provides a conceptual tool (Daniels, 2004) that incorporates dialogue (formation of ideas from different perspectives) and multivocality (a recognition that ideas and actions are formed by many voices). The role of each element and the interaction between elements can be interpreted within the model. Some authors, including Engestrom himself (2008), have also used this approach to analyze the school context (a good review may be found in Yamagata-Luynch, 2010). Taking these studies as a whole, we infer the need to construct new conceptual tools that take into account the dynamic nature of learning processes and the interaction between the different elements which, according to Activity Theory, define the system (Figure 1). Thus, Engestrom (2010) proposes the concept of Expansive Learning (EL), which prioritizes historical evolution and the role of conflict and contradictions in system transformation.

Electronic Journal of Research in Educational Psychology, *13*(2), 271-300. ISSN: 1696-2095. 2015, no. 36
http://dx.doi.org/10.14204/ejrep.36.14099

The expansion metaphor

The concept of *expansive learning* emerges in order to explain the movement inherent in the learning process (from incompetence to competence) and the nature of the change that enables this movement. Starting from this idea, Engestrom (2010) posed two questions related to the nature of learning: Is it a process that transmits and preserves knowledge, or that transforms it and creates something new? Is it a vertical process that improves over time, within a uniform scale of competencies, or a horizontal, hybrid model that moves between different contexts and competence standards?

The answer to these questions is found in the *expansion metaphor*, which places its focus on the community of learners in the transformation and creation of knowledge and in horizontal, hybrid movements. From this perspective, learners learn something that does not yet exist. In other words, they construct a new object in their collective activity, and implement this new object in practice. In order to understand all the implications of this idea, we must keep in mind that this theory distinguishes between the general object, emerging from the historical activity system and connected to a social meaning, and the specific object of a particular subject in a given action, connected to a personal, individual meaning.

Some recent studies (Fujioka, 2014. Patichen & Smithenry, 2014) have considered these principles when analyzing educational contexts and their transformation. Thus, the activity that takes place in the classroom, including the activity that targets students with special educational needs, can be interpreted as a collective activity with meaning based on its historical evolution and its connection to other systems. As in all other human activity, when we analyze what takes place in this formal sphere, we may distinguish a micro level where the actor or subject, in this case students and teachers, operate with instruments in order to reach short-term objectives. These actors in turn form part of collective activity systems at the macro level, defined by the history of the educational systems, theories of the curriculum, and government regulations on attention to diversity. These systems pursue long-term objectives with historical meaning, weaving together the individual activities carried out by teachers and their students. At times this relationship between the systems provokes tensions that cause it to expand and be transformed into something new and different. This process of change will be the purpose of this study.

Taking this view, when we approach a classroom where a new instrument (for example a video game) coexists with traditional practices and instruments, the unit of analysis is defined by the contrast between two systems (entertainment vs. formal) that partially share the same object, and the expansive transformation that it triggers (Engestrom & Sannino, 2010). As we shall see in the experience presented here, the participants -- teacher and students -- collectively reconstruct the object-problem, transforming and extending the activity system based on incorporation of a video game and on the dialectic contradictions that its presence produces in the other system, in this case, the traditional classroom.

The role of contradictions

Due to their importance in this framework of analysis, we pause briefly to explain the meaning of contradictions or tensions in the process of innovative transformation of the activity. The term contradiction should not be understood in a simple sense, only as a problem, obstacle or conflict. On the contrary, it reflects something more complex, indicating disparities that may occur within a single element or between several of them, between different activities or between different phases of one activity's development (Blin & Munro, 2008). From this approach, if we wish to evaluate whether an innovative experience in the classroom constitutes a transformation of the system, we should not focus our analysis only on transformation of the participants, but also more significantly on modifications that are produced in the structure as a whole and on each of its elements. A true expansion of the system has not taken place if the disruption, in this case the inclusion of a video game, does not affect the entire structure and all its elements, in other words, if it does not permeate the entire teaching-learning process.

Taking Engestrom (2010) again as our reference, contradictions are not something static that appear at a fixed moment in time, they may appear at different moments of the expansion process: a) latently, as primary contradictions related to one or several system elements; b) as secondary contradictions that appear between two or more elements (for example between old and new instruments, such as in the case study presented here); c) as tertiary contradictions that exist between a new activity model and remembrances of the former one; and finally, d) as contradictions that appear when faced with a new way of organizing the activity and its neighboring systems, using other organization methods.

All that we have indicated thus far, the expansion metaphor and the role and meaning of contradictions in the process, becomes quite suggestive when we seek to understand what happens in a classroom upon introducing a commercial video game as a mediator in learning. The presence of this medium establishes a dialectic relationship (Figure 2) between one system typical of entertainment and another system typical of formal teaching, thus triggering the creation of a new, innovative system.

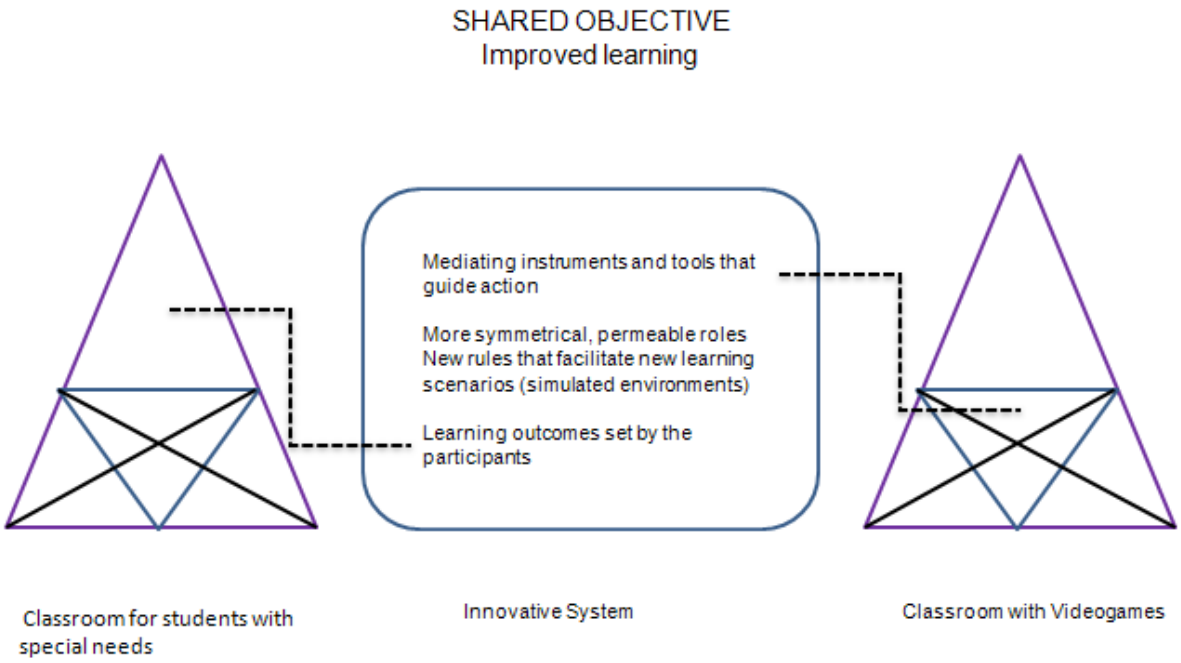

Figure 2. Tensions between systems that share the same goal (adapted from Engestrom & Sannino, 2010)

Objectives

The objective of this study is to analyze the teaching-learning process and its transformation when incorporating a commercial video game (Sim3) into a resource room. In order to interpret this transformation, our central concept for analysis will be the elements that define this learning space as an activity system, pointing out the tensions and the direction of change in each of these. This general intent can be identified as three specific objectives:

1) Analyze the role of the video game as a mediational instrument in the participants' joint activity (teacher and students).

2) Explore the tensions generated in the classroom, understood as an activity system, when a technological instrument typical of entertainment is introduced.

3) Analyze the effect of the conflicts and tensions between the traditional classroom and the new system generated by introducing the video game.

Method

Participants and context

This study was carried out in a public school, in the southern part of greater Madrid (Spain), in the context of compulsory secondary education. The use of commercial video games as an educational tool was implemented at several grade levels and with different teachers, over a period of three years (2009-2012).

The present case focuses on the special education teacher (specialist in therapeutic pedagogy), and two groups of students with special educational needs (SEN). The teacher ("RP") has over 25 years of extensive professional experience. With a five-year degree in pedagogy, she has taught at several levels of education, in addition to working as an advisor at teacher development centers. She has coordinated several projects in educational innovation. At the time of this experience, she had worked at the school for 4 years.

Participating in this study were 14 students, 6 boys and 8 girls between the ages of 12 and 16, who belonged to the "special" program for vocational qualification (PCPI). Except for one student with Asperger syndrome, who had previously been enrolled at a special school, all other students had received their schooling in a mainstreaming program from the start. The 7th grade class was made up of three students diagnosed with mental retardation, one had developmental delay and was behind in the curriculum due to a disadvantaged, at-risk environment, another was affected by Spina Bifida and the third was diagnosed with Asperger Syndrome. The 8th grade students had all been diagnosed with mental retardation, in one case associated with a disadvantaged, at-risk environment. Both groups presented learning disabilities and difficulty performing tasks that involve complex cognitive processes. Moreover, all were lacking to a greater or lesser extent in social and emotional skills.

 Electronic Journal of Research in Educational Psychology, *13*(2), 271-300. ISSN: 1696-2095. 2015, no. 36
http://dx.doi.org/10.14204/ejrep.36.14099

Instruments

In line with our study objectives, we chose data sources that enabled us to focus the analysis on exploration of processes and on the participants' interpretation and assigned meanings. Specifically, we used data in an audiovisual format for the analysis, with obvious advantages for an ethnographic study: recorded, semi-structured interviews, with the teacher (two initial interviews, two follow-ups, and one at the end of each workshop), and with the students, in the small group, at the beginning and end of the workshop; audiovisual recordings of four sessions (two in each workshop), photos and teacher-prepared summaries of each session, teaching documents (lesson plans and report on the activity), and texts that the students had written in a blog created for this experience.

Procedure

The teacher designed a video game workshop as part of her lesson plans in the social/language arts area. The video game selected, Sim 3, allows the player to design a character (self-defined) and to create a virtual scenario (city, neighborhood, family, etc.) that may be similar to the real world or totally fictitious. The player tries to embody as well as possible to the goals and aspirations of his/her avatar (job, social relations, state of health, etc.); toward this end she/he must make decisions and act within certain parameters and rules.

Table 1. **Objectives and activities in each session**

Sessions	Specific teaching objectives	Activities
1	Presentation of the workshop; Discover students' previous ideas about video games; Learn about their experience with video games; Present the workshop objectives and the video game.	Large-group dialogue Viewing a video game tutorial
2	Understand the concept of *description*	Design the avatars in the small group Verbally describe the physical appearance of each avatar (physical traits and way of dressing). In addition, describe their avatar in the blog created for this experience.
3	Understand the concept *personality* and the elements that define it.	Define the avatars' personality and his/her tastes and likes. Verbally describe the physical appearance of each avatar (physical traits and way of dressing).

4 and 5	Be introduced to the game process and problems that appear while playing, and how to solve them. Work on concepts as they come up during the game, such as types of jobs and their relationship to the characteristics of the avatars; consumer habits and use of money in daily life, etc. Develop their capacity for written expression and producing narrative.	Playing the game After game sessions, students wrote in a blog created for this experience.
6	Develop oral narrative related to the processes of the game. Become aware of the learning processes that have taken place and that are related to cognitive processes (problem-solving) and social processes (collaborative work, learning community)	Group discussion and preparation of group-level oral narrative.

The workshop was held with two groups of 7th and 8th graders in the "special" PCPI, as part of the curriculum of the general education module, specifically, within the social/language arts area. Each workshop was completed in six sessions that took place over four months of the same school year. The table reflects the objectives and activities of each session, common to both workshops.

In addition to the specific objectives (Table 1), the teacher's lesson planning covered four cross-curriculum objectives within the social/language arts area, which were developed throughout all sessions: develop thinking processes using technological resources; develop the learning-to-learn ability through the use of ICT resources and tools; encourage dialogue and reasoning using multimedia scenarios; boost self-esteem in each member of the group while learning to cooperate to meet a common objective.

The sessions lasted 80 minutes. Each session was organized along three phases: In the first phase (10 min.), a group discussion addressed the session objectives, starting with a review of what was accomplished in the previous session. In the second phase, divided into smaller groups, the game was played for 60 minutes. The final phase was a large-group discussion and review of what had taken place in the session, the accomplishments and difficulties that had appeared, taking into account the objectives that the participants had set. After the game sessions, students wrote in the blog, with help from the teacher, creating short narrations to describe their avatar and the life that they had designed for him/her.

The workshops were held in the resource room, equipped with two wii consoles, a television screen and a PC monitor. The teacher divided the students into two small groups ac-

Electronic Journal of Research in Educational Psychology, *13*(2), 271-300. ISSN: 1696-2095. 2015, no. 36
http://dx.doi.org/10.14204/ejrep.36.14099

cording to their differing abilities, where they might compensate for each other and work together collaboratively. The number of students in each group ranged from two to four.

Design and data analysis

The case study we present has been analyzed using qualitative methodology, following an ethnographic approach to case studies (Hamera, 2011; Yin, 2011). One fact to keep in mind is that these studies do not base their validity on the frequency of a certain phenomenon, but on the detailed description of cases in which it is possible to explain how the persons attribute meaning to their activity in defined sociocultural contexts. This form of research involves using different sources of data to help interpret the routines and problem situations of people's lives, using the meanings that they themselves assign to them. The case presented in this article is part of a broader research project entitled: *Images, Words and Ideas*.

Two different thrusts are pursued in this study. First, we consider the perspective of change. We are not interested in offering a snapshot of what takes place in the classroom. On the contrary, we are interested in the tensions and conflicts that the presence of a video game has generated in the traditional context, and how overcoming these has led to the creation of an innovative learning scenario. Second, we take the perspective of the participants. In order to carry out this intent, our main source of data is the interpretations of the actual participants – in AT terms, of the subjects and the community.

Results

Just as we have indicated thus far, the diagram model that defines AT allows us to understand, organize and integrate the qualitative data obtained in this case study. In the experience we are analyzing, the ordinary classroom underwent a series of changes when the teacher decided to introduce the SIM video game. The appearance of this technological instrument triggered an expansion of the system and the creation of something different.

In line with our study objectives, the different elements of the system will help us organize our presentation of the results. In relation to each of these elements, and based on the teacher's and students' interpretations, we explore the tensions and contradictions that arise

between the traditional system and a system where a new device is introduced, namely, the video game.

The reason for change. The object of the activity.

One of the first tensions that arose when the teacher proposed a video game workshop were the different interpretations within the educational community, and among the participants (students and teacher), as to the purpose of the activity (Figure 3).

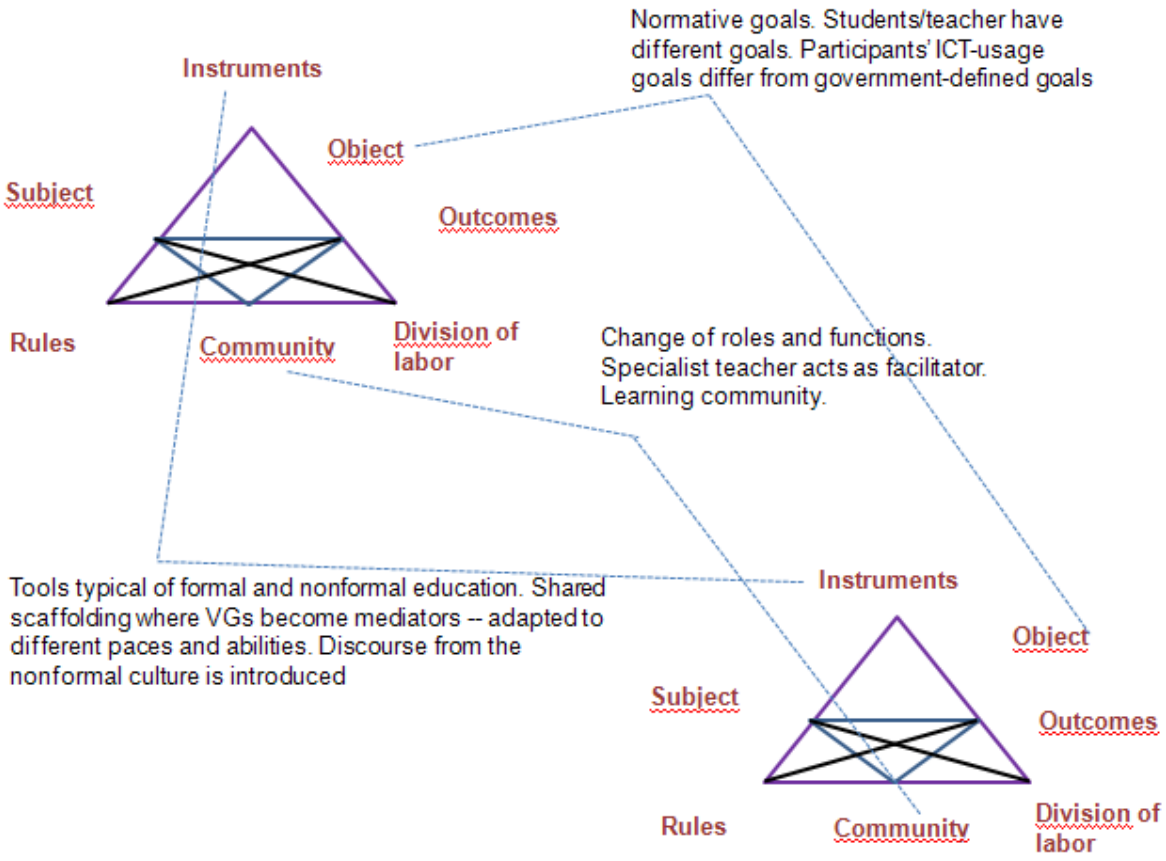

Figure 3. **System tensions and contradictions (I)**

Some of these tensions relate to the object of the group activity and to its interaction with other external systems. Others have to do with the goal of the activity and the actions of individual participants and their short-term motivations (Daniels, 2004). Presentation of the workshop to the school administration and faculty created tension between different perspec-

Electronic Journal of Research in Educational Psychology, *13*(2), 271-300. ISSN: 1696-2095. 2015, no. 36
http://dx.doi.org/10.14204/ejrep.36.14099

tives: the teacher's perspective, the perspective of some colleagues, and the social tendency to demonize this medium.

(First follow-up interview). When the video game workshops began, there were teachers that did not want it, because they just couldn't see it, they couldn't see the possibilities that could ... be prepared ..., many said "it's a waste of time" ..., and "how are we going to introduce something that they are hooked on, so they can get even more hooked" ... Furthermore when we started, at that time, there was social rejection toward video games, the idea was that kids spend hours on them and do not relate to other children.

In contrast to her colleagues' opinions, for RP the video game had clear educational possibilities. She had been convinced of this from her own experience as a player and from collaboration with the research team in prior experiences. In order to overcome this tension, formal and informal meetings with the teachers were held throughout the project, and visits were arranged to some of the video game workshops. As RP explains in the first follow-up interview, these steps helped overcome the tension, and helped some colleagues change their belief about video games and their educational possibilities. This change of attitude represented a system expansion toward more innovative propositions, agreed upon and shared by the educational community.

(First follow-up interview) The idea that changed, is that they saw how working with video games was more than just playing, that they were able to cooperate in a common task, the fact that they were not individual but group games, they had to make shared decisions ..., Some of the colleagues saw this .. and that is what convinced them.

These were not the only tensions. Contradictions also appeared (Figure 3) with other systems outside the school, in connection with the educational authorities. A good example was receiving a visit to one of the workshops from one of the teacher development advisors for this region.

(Second follow-up interview) The advisor came to visit one of the workshops and presented a negative report saying that there was no educational activity, that they were only playing ..., he did not see that there was any planning or educational work from the teacher in order to implement this activity, ..., for him it was only a game ...

The contradiction between the way the advisor and the teacher interpreted the activity is a good example of what Engestrom (2009) calls "multivocality" where different "voices" are present. This causes a contradiction between what must be done (political-administrative discourse) and what is being done (discourse of practice) (Larripa & Erausquin, 2010). In the face of this contradiction, the teacher manages to prevail with the discourse of educational innovation, reinterpreting the regulation and finding support in a comprehensive definition of the "digital competency", a term found in the government documents. From this perspective, as she tells in the final interview, she considers video games to be a good resource for developing cognitive and social skills.

(Final interview) For me it was clear, this was a very narrow way to interpret a competency which is part of the curriculum and the regulations, referring to the digital competency ... and I make recourse to that ..., digital competency is not just knowing how to use Word or look for information ..., ICTs are useful for many things, so are video games, many things can be learned with them, problems addressed, relating to others and creating stories for expressing oneself.

Over the course of the experience, and concurring with other studies (Swain, 2011), we also observed how tensions arose between the different goals and motivations of the workshop participants. The teacher's motivation, described above, must be contrasted with the students' motivation. Most of them considered the video game workshop as an opportunity to play and have fun, leading some students to reject the idea of using them in the classroom.

(Final interview). Even though you explain it to them ... I always explained it to them, that is wasn't just playing, that we were going to work on other things, but I think what they see is only the game ... Look, there were two very different reactions, one from those who had already played it who said "great!" ... and others who didn't like the idea. For example J, when I presented it, J told me: "Teacher, what for, we already have a lot of things to do ..., let's not start playing now, we came here to work ...".

Students' perception of it as only a game contradicts with the teacher's purpose – for her students to become aware and be the protagonists of their own learning. This was one of the main challenges to the new system, partly overcome by two activities introduced by the teacher: at the end of each session, discussing and reflecting together about what they had done during the game; and participating in a blog, describing their avatar and narrating his/her

virtual life. Both activities helped them to redefine their idea about the activity, getting beyond the game idea and becoming aware of what they had learned during the workshop.

(Interview with 2nd group) Researcher: Do you learn by playing with your avatar and the video games? -A1: Well, you learn to live together in the house, because three of us are sharing the house. And one is sleeping and the other is looking at how to sleep beside him..., we need to learn how to live together- Researcher: And what about you, what have you learned? - A2: You learn to ... it's a view of what real life is like. In a way it is real life, but ... it's a ... it's like real life, but more fun.

These answers show how the teacher's goals and the students' goals came together and they reached a common objective, in this case, a learning space.

The participants and their role in the transformation

Another of the elements that created tension had to do with the subjects' identity and place within the educational community (subjects being the students with special educational needs). As we saw before, the "correct" discourse of educational inclusion (what it ought to be) collides with certain practices inherited from traditional models. This contradiction is what the teacher reveals when she is asked about how the educational community sees the students.

(First initial interview). For the school, these students are a separate group, they are the "special" group, that's kind of their title ... In general, these students are treated, almost always, according to what they cannot do ..., and they feel this way too, because throughout their school years they have lived through frequent situations of failure, making them feel incapable and that others see them as having few possibilities.

As RP describes, despite regulations that favor educational inclusion, these students are identified by the disability that hinders their access to curriculum content. This belief places them in a space that is defined by their disorder and by their inclusion in specific educational programs. The workshop design and the introduction of a video game into the classroom represented a system expansion toward other competency definitions. In the new system, inherited from an entertainment system, competence is measured by overcoming the challenges and problems posed during the games.

(Summary, 2nd session, 1st group) Today A did not come, and L has put the console together by herself, she seems quite satisfied to have managed it, without help.

In this extract from the 2nd session summary, we observe that one student ("L") has developed a new competency, enabling her to accomplish a task autonomously (putting together the console) which she previously did with the help of a more expert classmate ("A"). While tasks in the traditional system require a fixed measure of competency, in the workshop, competencies are more open and flexible. In this system, competence is measured from two standpoints, the player's own representation of her competence, and the degree of competence that the other players attribute to her.

(Recording of third session. 1st group) Teacher: Did she buy the refrigerator? - A 3: Yes - A2: I didn't buy it, it was them ... - A3: No, teacher. I explained it to her and she bought it. - A2: Oh, yeah… it's true, in the end I bought it myself... -Teacher (speaking to A2): well now try to buy the bed - A2: OK, here I go.

In this transcription of the third session, one student (A2) doubts her own ability to buy furniture. This idea contradicts the view of her classmates who think that she is indeed able to do so (A3). Her game partners' representation of her competency, together with success experiences that she has had throughout the sessions, have given her the opportunity to confront and overcome new challenges (well outside of the traditional curriculum), thereby increasing her self-confidence.

This transformation of competency grading also caused a change in the distribution of roles, giving the community members different functions and responsibility within the activity. In the resource room, before incorporating the video game, the relational structure, inherited from a traditional model, placed the teacher in the center, adopting the unique, exclusive role of expert, as opposed to the students.

(Second follow-up interview) In class it's the teacher who decides, they do not know how to take initiative on their own, they have a very distorted view of their skills, and we as teachers do not believe that they can participate in their own learning ..., in new initiatives or activities they always say: I can't, I don't know.

As RP expresses in the initial interview, in a traditional classroom the teacher organizes learning, imposing the script of activities, including the sequence of actions or selection of an instrument (Heemskerk, Volman, Dam, & Admiraal, 2011). In this system, students assume a passive role, having a very peripheral form of participation in the process. This model

comes into conflict (Figure 4) with the new structure of the workshops, where including a practice from entertainment, that of playing with video games, means a transformation of established power relations in the classroom, and a conflict arises between the meaning given to experts and novices, by the traditional system and by the innovative system.

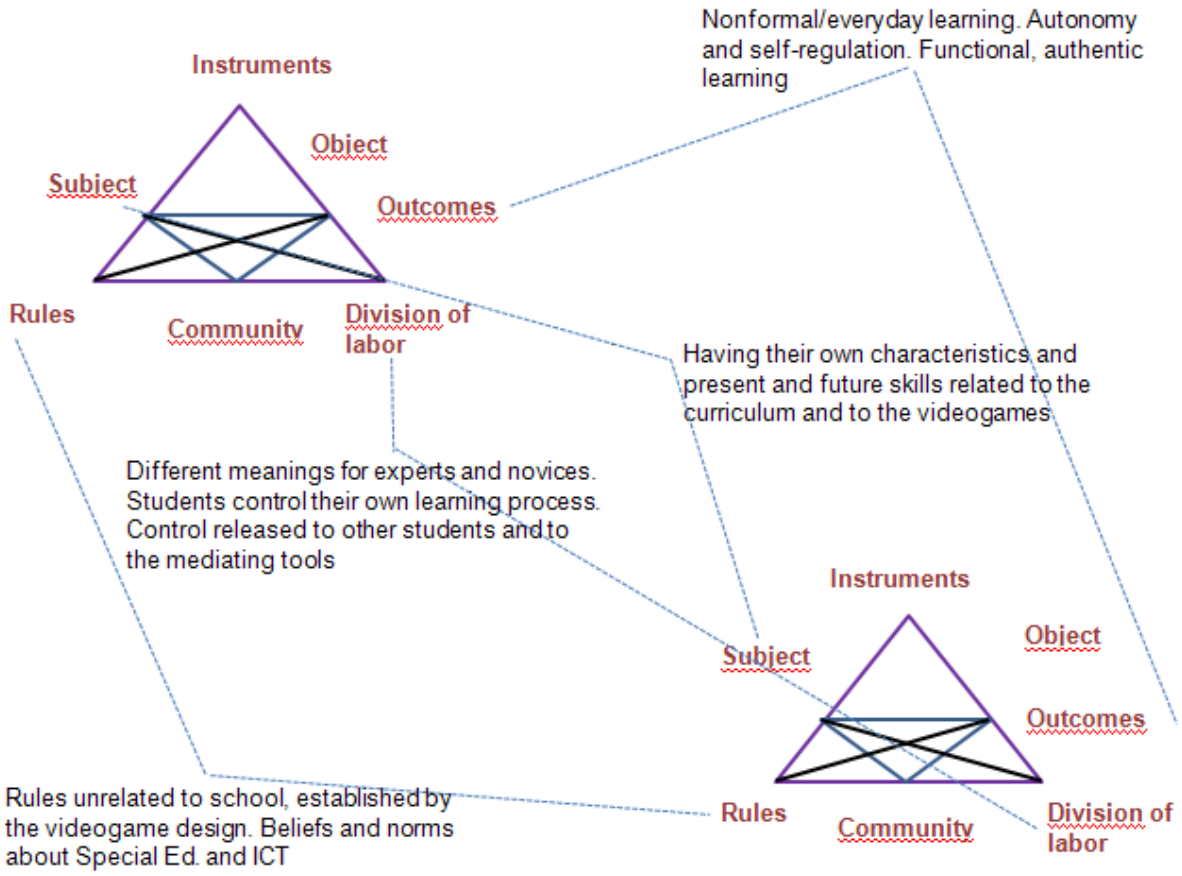

Figure 4. **System tensions and contradictions (II)**

The direction of change. Mechanisms and rules of the system.

There are two elements that guide and lead the system expansion process, transforming it into something different: the mechanisms that mediate between the subjects, the object and the results of the activity, and the rules and norms that delimit these activities.

In the interview, RP explains the type of instruments used in the resource rooms, where oral and written discourse is the main mediator in learning, to the exclusion of materials and instruments that use other languages and codes.

(Second initial interview) Normally, this is like a traditional class, there is material for them, worksheets, specific books with adapted curriculum, defined content, activities with the

usual structure ... What we do most are pen and paper activities ..., the goal is to meet the objectives, learn certain content.

Her experience over the years has convinced RP of the need to introduce new instruments and to design a new system where traditional and new tools coexist.

(Summary, 2nd session, 2nd group) Iv verbalized his difficulty with the game "I don't get any of this teacher". I suggested that we review what each of the control buttons were for, and the icons that appear on the screen. We analyzed them one by one to understand their meaning, and he began to feel more sure of himself, "Now it's coming, teacher" ...

In this excerpt from the summary of the 2nd session, we can observe that mediation does not focus exclusively on the teacher and her oral discourse, but it is distributed among other "voices" and tools. The teacher allows the elements of the instrument itself to help Iv achieve his goals.

(Recording, 4th session, 1st group) One of the students, when his turn came, tried unsuccessfully to get his avatar into the bedroom. A: I don't know how it works ... (he gives the remote control to the teacher). *P:* (the teacher gives him back the remote) *press here and point it toward the screen, to the right ...* (the teacher sits beside him). *What do you think is the matter, why doesn't it move forward?* (she points to the screen, where there is a triangle, a symbol indicating the state of the avatar) *look, let's see what it's telling you ... A: It means he's tired, he needs to sleep, so I have to find a bed ...*

Figure 5. **Tools and signs that mediate the activity**

In this dialog transcription we observe how, with assistance from the teacher, icons that indicate the state of the avatar (Figure 5) and signs that appear on the remote help this student by indicating to him what he can or cannot do, and showing him each possible action. This way, the teacher is not the only assistance that the students receive; the new instruments,

Electronic Journal of Research in Educational Psychology, *13*(2), 271-300. ISSN: 1696-2095. 2015, no. 36
http://dx.doi.org/10.14204/ejrep.36.14099

the video game and the signs and symbols that make up its language have become another element for "scaffolding" learning.

An interpretation of how the video game has mediated the activity would not be complete without reference to contradictions that appeared regarding the rules and norms that regulate ICT use in general, and the video game in particular. From a remedial perspective, which defines traditional support systems, we find two approaches that establish the use of technology (Abbott, 2007, 2011; Monjelat & Méndez, 2012). One of these considers technology to be a resource for training skills; in the other approach, technology serves to enable learning. In this interview, the teacher recognizes that these two approaches coexist in the classroom as ways to interpret the relationship between technology resources and learning.

(Second initial interview) Yes, I have used them at times ... they are programs for training skills in arithmetic, they complement other activities, perhaps are more motivating ... like transferring the exercises from a book into a more attractive setting. The advantage perhaps is that mistakes are seen differently, they are not as closed or as evident. Well, and in certain cases we also used ICTs for ... the computer with certain software programs gives them access to certain tasks, such as when they have vision problems and we can enlarge the typeface.

On the other hand, the presence of the SIMs introduces rules from the game (Figure 5), determined by its design and by the virtual world that is created. Just as traditional textbooks used at school have their own rules, the video game has other rules defined by the virtual settings that allow or limit the players' actions (Gee, 2007). In this universe, the students/players can "simulate" life in a fictitious social environment. In order to do so, the video game offers new tools and codes (images, sounds and simulations), so they may interpret the world and act on it.

(Blog entry, 1st group). My name is Ken I am 27 years old and now I am living with some friends. I am a quiet and brave person, I like to do outdoor sports, swimming and eat a lot.

In the simulated world of the Sims, the author of this text may represent a fictitious "I". Through his created avatar, he projects his desire to lead an independent life, living with friends. A life that is outside of his reach, because of his disability.

(Interview 1st group) Researcher: The avatar is as if it were you? - Al: Of course. - Researcher: Tell us about it again. - Student: Well my name is Ken, even though they don't call me Ken, my name is xxx; I am 27 years old, even though I am 18; I live with a friend ... - Researcher: With a friend? - Al: I like to talk to him, to chat, I like to eat with friends, garlic chicken wings, I like all that.

In this final interview, this same student, with a marked handicap in the area of social relations, explains in first person how he lives and relates to others through his avatar.

The consequences of change. System outcomes.

Finally, we look at the outcomes of the activity, an element of the system where significant contradictions and tensions are produced. In the case we are analyzing, a "special" PCPI course (social/language arts area), the educational administration establishes competencies through the curriculum, which students must develop. Competencies in this area relate to the use of language as a means of expression and of relating to the world. Even though the regulations refer to a competency in different forms of expression, the prevailing teaching culture gives predominant interest to the grammatical components of language, as RP tells in the interview excerpt.

(Final interview) The strong suit of all the teachers is the grammatical part, knowing the personal pronouns..., whether you are speaking in first person...,. Emphasis is placed right on what is most difficult for them and what is moreover the least useful ... the same stuff is being taught all the time, and we've seen that it doesn't work, ...

This interest in grammatical knowledge conflicts with the teacher's purpose, wanting to equip students with competencies to express themselves and relate through different ways and codes.

(Final interview) What I care about is oral expression, that they express themselves..., the grammatical part doesn't interest me so much, I leave that alone, it's what comes in the official curriculum, ..., what I care about is that they are able to express themselves in many ways, and so be able to face personal and vocational situations, for example, receiving a visitor, if they end up as caretakers ...

This tension led the teacher to a decision to introduce new languages and forms of expression. Involving the video game and the blog changed the prevailing trend, allowing students to express themselves by combining languages (written text and image) in the construc-

 Electronic Journal of Research in Educational Psychology, *13*(2), 271-300. ISSN: 1696-2095. 2015, no. 36
http://dx.doi.org/10.14204/ejrep.36.14099

tion of narratives based on simulated settings; see Figure 6, the text and screen capture that one student posted in the blog.

Entry by Lorena (9 months ago)
Yesterday I went to work, I am a police officer, I wrote tickets, stopped the traffic, and got my pay. I bought a new TV with the money and I also had to pay a bill.

Figure 6. **Constructing narratives in the blog**

During this experience, the type of outcomes expected in a formal context -- relating to curriculum content and single-solution tasks -- coexisted with the outcomes expected when playing a video game. Including an object that belongs to the culture of entertainment meant a change in the nature of the outcomes, enabling the players to adopt different solutions to the same problem. In the following transcription, we see how two groups of students, faced with the need to find work and get money to live on, used different strategies to reach a solution.

(Recording of 3rd session, 2nd group)- Teacher: and what did you do to find work- A1. We went into the shops to see if they needed anybody -Teacher (speaking to another group): *and you? - A2: We looked on Internet.*

Additionally, learning that is attained by students in the simulated environment of the video game has immediate, functional consequences, unlike what occurs in formal education when learning outcomes are not meaningful to the learner. The following dialog between the teacher and two students reflects how they are learning to solve real problems from everyday life.

(Recording 3rd session, 2nd group) Teacher: But what is the problem? - A3: the beds - Teacher: Wait, let's see ... who has bought the beds? - A2: Me, I just bought one. - Teacher: And why did you only buy one bed? - A3: Of course, she could have bought three, and in the meantime we could have bought the avatar's food. Of course, she didn't do it because she didn't want to. -RP: if there were three of you living in the house, why did you just buy one bed? - A2: Because I was just thinking about myself, not them (laughter) - Teacher: So then, the problem was that you were only thinking about yourself.

As a consequence, the outcomes or products of the activity changed, moving away from exclusive focus on curriculum knowledge, typical of formal education, and moving toward everyday knowledge that prepares them for life and helps lead them toward greater autonomy, self-regulation and control over their own learning process.

Discussion

What happens when we introduce into the school an instrument from the realm of entertainment? In this study we tried to answer this question by focusing our interest on the change and transformation process that a video game (an instrument from outside the formal context) might trigger in the teaching-learning process. Three ideas have guided our analysis: (1) the idea of human activity as a system defined through group activities with a complex mediational structure (Leontiev, 1978); (2) the idea of learning as movement toward change, characterized by the integration of and dialectic interaction between all the elements that make up the system (Engestrom, 2001, 2010; and (3) the idea of interpreting classroom activity as a collective activity that has meaning based on its historical evolution and its connection to other systems (Fujioka, 2014, Yamagata & Luynch, 2010). This relationship between systems provokes tensions that cause it to expand and be transformed into something new and different (Engestrom, 2001).

Starting with these core ideas, the first result we wish to highlight pertains to the goal or object of the activity. During the analysis, we observed that inclusion of a technological instrument from outside of the classic ICT repertoire (of both the teaching culture and governmental regulations) caused tensions between the systems inside and outside the school (Cross, 2010). RP's own colleagues did not understand the decision she made, nor did the govern-

mental representatives. Neither group shared the teacher's view of the possibilities of video game use. This result indicates the coexistence of models reflected in different "voices and discourses" (Daniels, 2004; Fujioka, 2014), such as the political-administrative discourse or the voice of teaching practice. As we have seen in the results, this coexistence required steps of negotiation and agreement. Throughout these sessions we observed how overcoming this tension helped transformed the system into a scenario where the video game went beyond its entertainment-related meaning and became a mechanism that mediates and transforms the learning context.

Another interesting and especially significant result in the model of analysis posed here (Oswald, 2014; Phama & Renshawa, 2015) has to do with the participants -- the interaction between them and their role in the activity. In the new system created through introduction of the video game, although the teacher continues to be a fundamental guide, the presence of the video game caused a transformation in the classroom social interaction and in the roles adopted by the participants. This concurs with results from other studies (Saljo, 2010). A methodological change and the incorporation of a new instrument offered students the chance to take on the role of experts, leading to the appearance of scaffolding processes between peers, and of cooperative learning (Engestrom, 2014). Getting past a strict, fixed distribution of roles transformed the classroom into an innovative space, with greater permeability of roles and a more symmetrical interaction between students and their teacher, who acted primarily as facilitator.

Another element that undoubtedly has a very important role, as our results show, are the mechanisms and their meaning in mediating the participants' joint activity. As in other studies (Engestrom, 2010; Watson, Mong & Harris, 2011), we observed system expansion over the course of the sessions, explained by the coexistence of old and new mechanisms able to create conflict between different conceptions, in this case, about the use of technology in the classroom. The teacher and the students themselves had to modify their conceptions about the presence of technological instruments as mere facilitators in skill acquisition, and come to consider them mediators and promoters of innovative learning scenarios. Add to this the very nature of the instrument introduced, a device typical of an entertainment system. We were able to observe in the different game sessions how the SIMs became a mediational instrument and determining factor in the process of expanding and changing the system and its different

elements. This mediation cannot be understood without mentioning the rules and norms imposed by the characteristics of this video game. The SIMs introduced into the classroom a new code of communication and expression (Gee, 2010, Méndez, Lacasa, & García-Pernia, 2013). This code consisted of languages that are normally absent in classrooms, namely, image, sound and simulation. This understanding has led us beyond the perspective of the video game as a technological tool that may assist or facilitate learning, to considering it a cultural object through which new practices, codes and languages are incorporated into the classroom, thereby mediating classroom activity and transforming all the elements of the system.

Finally, the characteristics of the video game proved to be determining factors in the transformation of outcomes, in the consequences of the change. Unlike traditional environments where predefined responses are expected from the students, and there is a single path for learning them, several possible outcomes coexist in the system created during these sessions, and there are different ways to reach them (Baek, 2009; MacMath, Roberts, Wallace & Chi, 2010). On the other hand, the learning that students attained within the simulated, video game environment caused a substantial change, transforming the setting of the problem and consequently its solution as well. When playing with the SIMs, problems representing real life situations appear in the virtual world, and decisions have immediate, functional consequences, unlike what occurs in formal education when learning outcomes are not meaningful to the learner.

The results obtained here and analyzed according to Activity Theory, offer evidence of the need to build new conceptual tools that take into account the dynamic nature of learning processes, the interaction between different elements that determine change, and the transformation that is triggered by contradictions between systems. The results of this study have revealed that Activity Theory and its diagrammatic, expansive conceptualization is a powerful tool for analyzing the process of change when a new technological instrument is incorporated as a mediator in learning.

 Electronic Journal of Research in Educational Psychology, *13*(2), 271-300. ISSN: 1696-2095. 2015, no. 36
http://dx.doi.org/10.14204/ejrep.36.14099

Acknowledgments

This study is part of a research project financed by the National R&D&I Plan, EDU2009-07075 (subprogram EDUC) (2009-2012). We wish to thank the students from *Manuel de Falla* secondary school in Madrid (Spain) and teacher Rosa Piriz; their participation in the project has made this study possible.

References

Abbott, C. (2007). *E-inclusion: Learning Difficulties and Digital Techonologies*. London: Kings College.

Back, Y. (2009). Digital Simulation in Teaching and Learning. In D. Gibson & Y.K. Baek (Eds.), *Digital Simulations for Improving Education: Learning Through Artificial Teaching Environments* (pp. 25-51). New York: Information Science Reference.

Blin, F., & Munro, M., (2008). Why hasn't technology disrupted academic teaching practice? *Computers and Education*, 50, 475-490. DOI:10.1016/j.compedu.2007.09.017

Cross, R (2010). Language Teaching as Sociocultural Activity: Rethinking Language Teacher Practice. *The Modern Language Journal*, *94*(3), DOI:10.1111/j.1540-4781.2010.01058.x

Daniels, H. (2004). Cultural historical activity theory and professional learning. International *Journal of Disability, Development and Education*, *51*(2), 185–200. DOI:10.1080/1034912041000168739l

Engeström, Y. (2001). Expansive Learning at Work: toward an activity-theoretical reconceptualization, *Journal of Education and Work*, *14*(1), 133–156. DOI: 10.1080/13639080020028747

Engeström, Y. (2008). *From teams to knots: Activity-Theoretical Studies of Collaboration and Learning at Work*. Cambridge: Cambridge University Press. DOI: 10.4018/jmbl.2009040101

Engeström, Y. (2009). Wildfire activities: New patterns of mobility and learning. *International Journal of Mobile and Blended Learning*, *1*(2), 1–18.

Engeström, Y. (2014). *Learning by Expanding*. Cambridge: Cambridge University Press.

Engeström, Y. & Sannino, A. (2010). Studies of expansive learning: Foundations, findings and future challenges. *Educational Research Review, 5,* 1–24. DOI:10.1016/j.edurev.2009.12.002

Gee, J.P. (2007). *What Video Games Have to Teach Us About Learning and Literacy*. Second Edition: Revised and Updated Edition [Paperback]. New York: Palgrave Macmillan.

Fujioka, M. (2014). L2 student–U.S. professor interactions through disciplinary writing assignments: An activity theory perspective. *Journal of Second Language Writing, 25,* 40–58. DOI:10.1016/j.jslw.2014.05.004

Hamera, J. (2011). Performance ethnography. In N. K. Denzin & Y. S. Lincoln (Eds.): *The SAGE Handbook of Qualitative Research*, 4th ed., 317–330. Thousand Oaks, Calif. London: Sage Publications.

Heemskerk, I,, Volman, M., Dam, G., & Admiraal, W. (2011). Social scripts in educational technology and inclusiveness in classroom practice. *Teachers and Teaching: Theory and Practice*, *17*(1), 35-50. DOI: 10.1080/13540602.2011.538495

Janneke M., Frambach , J., Driessen., E., van der Vleuten, C. (2014). Using activity theory to study cultural complexity in medical education. *Perspectives on Medical Education*. 3, DOI: 10.1007/s40037-014-0114-3

Joy, R. & Murphy, E. (2012). The Inclusion of Children with Special Educational Needs in an Intensive French as a Second-Language Program: From Theory to Practice. *Canadian Journal of Education, 35*(1), 102-119.

Juffs, A. & Friedline, B. (2014). Sociocultural influences on the use of a web-based tool for learning English vocabulary. *System*, *42*(2), 48-59. DOI: 10.1016/j.system.2013.10.015

Lacasa, P., Méndez, L., & Martínez, R. (2008). Developing new literacies using commercial videogames as educational tools. *Linguistics & Education*, *19*(2), 85−106. DOI: 10.1016/j.linged.2008.02.001

Larripa, M., & Erausquin, C. (2010). Schooling practices and autism spectrum disorders: tools and challenges for the construction of inclusive school settings. A study from C.H.A.T. (cultural-historical activity theory) framework developed by Engeström. *Anuario de Investigaciones*, 17.

Leontiev, A. (1978). *Activity, consciousness, and personality*. Englewood Cliffs: Prentice-Hall.

MacMath, S., Roberts, J., Wallace, J., & Chi, X. (2010). Curriculum integration and at-risk

students: A Canadian case study examining student learning and motivation. *British Journal of Special Education*, 37, 87-94. DOI:10.1111/j.1467-8578.2009.00454.x

Méndez, L., Lacasa, P., & García-Pernía, M. (2013). Digital communities and videogames as educational tools in participatory culture. *International Journal Social Media and Interactive Learning Environments*, *1*(2), 145-163. DOI: 10.1504/IJSMILE.2013.053602.

Monjelat, N., & Méndez, L. (2012). Problem solving Processes and Videogames: The Sim City Case, *Electronic Journal of Research in Educational Psychology*, *10*(3), 1493-1522.

Oswald, M. (2014). Positioning the individual teacher in school-based learning for inclusion. *Teaching and Teacher Education*, 37, 1-10. http://dx.doi.org/10.1016/j.tate.2013.08.002

Patchen, T & Smithenry, D. (2014). Diversifying instruction and shifting authority: A cultural historical activity theory (CHAT) analysis of classroom participant structures. *Journal of Research in Science Teaching*, *51*(5), 606-634. DOI: 10.1002/tea.21140

Phama, T. & Renshawa, P. (2015). Formative assessment in Confucian heritage culture classrooms: activity theory analysis of tensions, contradictions and hybrid practices. *Assessment and Evaluation in Higher Education*, *40*(1), 45-59 DOI:10.1080/02602938.2014.886325

Säljö, R. (2010). Digital tools and challenges to institutional traditions of learning: technologies, social memory and the performative nature of learning. *Journal of Computer Assisted Learning*, 26(1), 53–64. DOI: 10.1111/j.1365-2729.2009.00341.x

Swain, M., Xinnear, P., & Steinman, L. (2011). *Sociocultural theory in second language education: An introduction through narratives*. Bristol, UK: Multilingual Matters.

Watson, W. R., Mong, C. J., & Harris, C. A. (2011). A case study of the in-class use of a video game for teaching high school history. *Computers and Education*, *56*(2), 466–474. DOI: 10.1016/j.compedu.2010-09-007.

Yamagata-Lynch, L. & Haudenschild, M. (2009). Using activity systems analysis to identify inner contradictions in teacher professional development. *Teaching and Teacher Education*, *25*, 507–517. DOI:10.1016/j.tate.2008.09.014

Yamagata-Lynch, L. (2010). *Activity Systems Analysis Methods*. *Understanding Complex Learning Environments*. New York: Springer.

Yin, R. (2011). *Applications of Case Study Research*. California: SAGE Publications.

[This page intentionally left blank]