School Goes Online With Avatars:
Extended Learning in a Secondary School

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Abstract: This paper focuses on the initial implications of students' extended activity between virtual and in-presence learning. The study is part of an ongoing project founded in 2018in a CSCL setting titled "e-PIm" (Incubator of Immersive Pedagogy for Virtual Reality) taking place in a secondary school in France labelled as pilot in 2016. For this study, some data are selected and qualitatively analysed. The implication of the implementation of the Multi-user Virtual Environment emerge in the field of didactics, student-teacher interactions, and students' corporal and socio-cognitive behaviours; the uses of the MUVE are revealed to be an ongoing transformative learning experience through an extended learning space and institutional change.

Introduction

For long time, the walls of the classroom and the school were the limited space where students shaped their learning. This "broadcasted mode" gave a central role to teachers and scholastic books. Technology, the multicultural dimension and continuous social and economic change have disrupted and undermined the traditional system: learning environments have multiplied, going online (Tapscott, 2009) in clouds. It is acknowledged that learning technologies do not necessarily involve innovation, rather they are catalysts that, when used well to carry out a communal piece of work or task, allow high engagement and active learning between school and life (Dawley and Dede, 2014) and within virtual communities (Preece, 2001).

One way to extend learning between the classroom and the virtual realm is the use of MUVEs. Made popular by Second Life, the MUVE is an immersive 3D virtual space where people, entering the space via their avatars, meet and interact with one another and with 3D objects in real time. The use of a virtual space in the classroom can introduce changes to how the teacher executes, facilitates and releases the learning through authentic tasks involving 3D object manipulation, creativity and corporal mobility via avatars, which bring change to how the learner acquires, applies and constructs knowledge (Jung & Latchem, 2011). This paper focuses on the initial implications for students' extended activity between virtual and in-presence learning, from the general broad perspective of how technology-supported collaboration can facilitate the sharing and dissemination of knowledge and competencies among community members (Di Blass and Paolini, 2014). The study is part of an ongoing project entitled "e-PIm" taking place in a pilot secondary school in France (students from 11 to 15 years old). For this study, some data are analysed and initial research results are presented.

The project: Incubator of Immersive Pedagogy for Virtual Reality

The project "e-PIm" takes place in a pilot school, in line with the Digital Plan for Education launched by the French government in May 2015and related to the appropriation of tablets distributed by the academy as part of the "*Connected Schools*" project. The school set out on the path of digital experimentation in 2016 and is being financially supported by the Digital Education Directorate from 2018 to 2021. The three aims of the project are:

1) to propose a scientific study over a period of 4 years (since September 2018). It is about the technological and social conditions of appropriation of virtual reality, in a network of primary and secondary schools;

2) to support, on the territory of the academy via a collaborative network, the sharing of knowledge resulting from the joint work of researchers and teachers;

3) to create a training guide for trainers or teachers wishing to get involved in this field.

The general project considers Participatory Action Research (Wadsworth, 1998) for an interdisciplinary approach, involving didactics, sociology, psychology and management science. Within this method, participatory and collaborative processes are developed with and the aim of achieving a critical change of practices, through continuous spirals of planning, action, observation, reflection and re-planning (McIntyre, 2008). The research is built on four immersive pedagogy projects developed by the teachers at the school in collaboration with the ITC and research partners: 1) "*Interdisciplinary*" is an experiment in 3D scriptwriting of lessons (English, Italian, French, History, Mathematics, Technology), on two 5th-year classes in which students are asked to build 3D objects in the virtual school and give meaning to them within the framework of a scenario

dealing with the seven new wonders of the world; 2)"*Language and International*" focuses on remote linguistic exchanges between the French students and a class of correspondents, via their avatars who visit and explain the meaning of a virtual exhibition prepared beforehand and showing photos of their favourite places in their city; 3) "*Homework*" is about help with distance work that allows small groups of students to benefit from homework support provided by a school teacher in their home environment at the end of the afternoon; 4) "*Work on SEGPA*": The MUVE is used here for learning in two different trades as well as in general disciplines.

The global strategy of data-gathering, launched back in 2016 and still ongoing, is proposed in a longitudinal approach. A multilevel approach considers the territorial, organisational, collective and individual level. In this way, we view the appropriation of the 3D space from a different, complementary and interdisciplinary perspective, as represented in Figure 1.
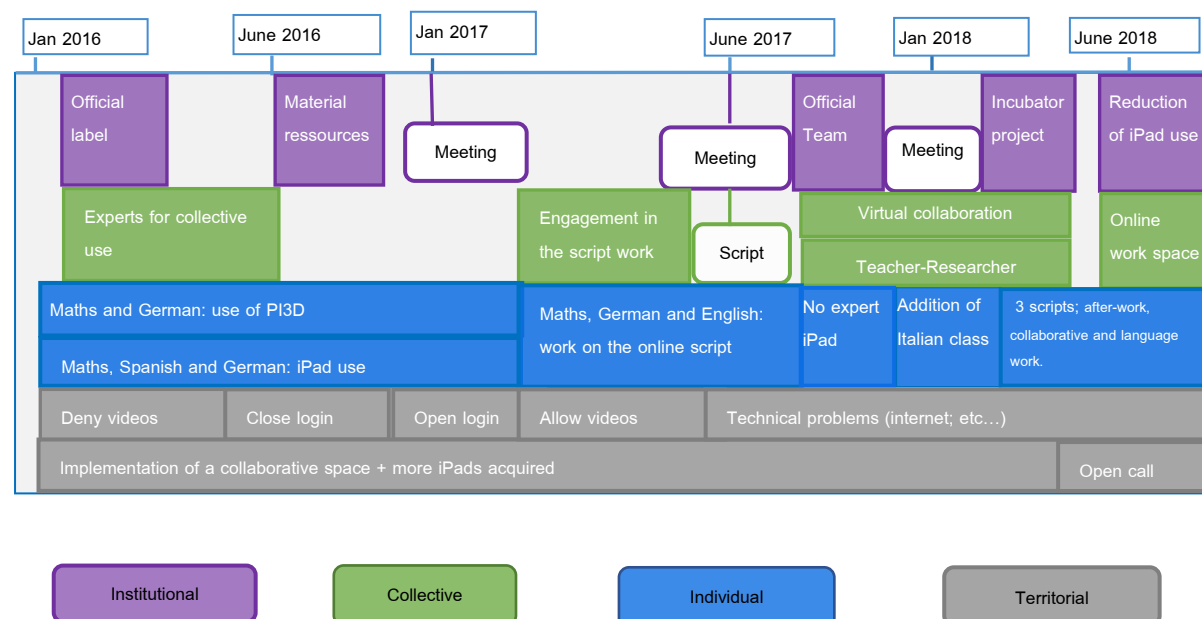

Figure 1. Multilevel approach to data-gathering.

Methodology

Ethnographic observations (with note-taking and photos), analysis of the virtual space (written text in chat, forum, recording of online activity and online discussion) and collection of practices inside the school (verbal exchanges, report minutes, individual interviews) have been made since January 2016. To organise the data, the NVivo software is used to structure the corpus and encode it with specific dimensions and shared encoding between the researchers' group following a grounded approach.

The aim of the study

The research questions are: What are the main first direct implications of the project for students' extended activity between virtual and in-presence learning? What indirect implications does the project have for teachers and the school in general?

Initial analysis of data

For an answer to the research questions of this study about the initial direct implications of the project for students' extended activity between virtual and in-presence learning and the indirect implications of the project for the teachers involved and the school in general, the corpuses of data selected are: five student interviews and direct online and in-classroom observation; nine teacher interviews on different subjects relating to students online and in-classroom activity; two video recordings of meetings between teachers and researchers. An analysis of content and discursive exchanges is applied to data (Bezemer & Kress, 2017). Four dimensions emerged from the selected data: MUVE didactic affordances; MUVE student-teacher interaction; MUVE students' corporal and socio-cognitive behaviour.

Findings

Regarding the 3D space's affordances for didactic activity, for the teachers, we observed a rise in mental load with an increased permeability between working time and home time for the scripting activity. This time seems counterbalanced by the benefit of being able to make children work with this use of technology. The teachers wonder about the opportunity presented by the introduction of the 3D space in relation to their pedagogical script, linked to the affordances of the technological tools. The understanding of the 3D environment's potential offers new opportunities, as this extract shows: "*When the coordinator told me about avatars, I said to myself, why not? We can exchange objects, and on Skype, it does not always work very well*". In maths also, the 3D space is interesting to some teachers as it abolishes the physical limitation: "*the skills learned: moving on a map, I extended it to the virtual school, we had only two dimensions*". For each discipline at the school, the use of the 3D space represents differentiated interests besides the fact that it improves the possibility of situated learning. Students, on their part, stress the evolution of the use of the virtual space, as a girl from 5 class put it: "*We started before the Christmas holidays, but at the beginning we did not go as often as now, when you do not know what to do about it ...*".

Regarding the effect of the 3D space on student-teacher interaction, linked with the ITC opportunity, teachers suggest that use of the 3D environment improves interaction with students, which can be different, focusing on a new modality of learning. For example: "*In the classroom I move around to advise and help, and it's easier when you have an assistant. On the platform, it is all the more possible because we have the headphones and the microphone, in the classroom it is difficult, there is a lot of noise that can disrupt communication, but in the virtual school not yet*". The use of 3D helps teachers to interact with students in a new way, with a "silent body", the avatar, which allows idealistic communication without disturbing interferences.

Regarding the effect of the 3D space on the behaviour of the students, the teacher interviews stress the physical implications for their classroom activity. Although the students can be "quieter" in the classroom because they are sitting ("*the students are no longer disturbing the class when they are able to connect*"), paradoxically, students are very active online ("*Children in the space are much more dynamic, there they were very active behind their screen*"). At the same time, the use of the 3D space can also help to support the students in a particular part of the day or of the year, when they are more tired ("*at the end of the year we must also give new motivation to the good students, who begin to get tired, and the students with difficulties...*"). Finally, for the children interviewed, the 3D space represents either a space of creativity, or a space of motivation and resilience used at school as well as at home. The uses of the MUVE when children are at home, helps and support distant exhanges with their teacher in the aid device to homework's in particular. When used to achieve collective tasks in class, it enhances exchanges also, for profiles of very shy children who have difficulty participating.

Regarding the effect of the 3D space on institutional change, during the process and the exchange between teachers, researchers and students, different points are constantly being negotiated, like the right to take pictures of students' faces and the authorisation to destroy 3D objects or virtual documents ("*if we leave the documents in the immersive space, they can be damaged, modified, or deleted, how do we protect them?*"). As a consequence, the script with the MUVE is continually evolving in relation to technical and administrative aspects, linked to the prescriptions of the curriculum and teachers' preferences, like in this teacher's comment: "*… unless the government comes back on those two hours a week, we work together with a maths teacher who guided us to the virtual school: with the avatar it is better to break the ice, offering a nice, warm welcome in a space for discussion*".

Discussion

As shown by the initial data analysis, the implementation of the project, and in particular the MUVE technology, have had and still have implication for didactic, student-teacher interaction, students' corporal and cognitive behaviour and institutional change, becoming an ongoing transformative learning experience.

Regarding the 3D space affordances for didactic activity and student-teachers' interaction, we stress how the introduction of technology oblige the teacher and also the student to rethink the traditional model, as widely discussed in the technology. The process of appropriation also includes aspects concerning the mutual influence between the technology and the users (Overdijk & van Diggelen, 2008), with a simultaneous transformation process including the learner and the tool and where the learners are also teachers. The originality of our initial finding lies in the socio-professional and organisational conditions for teachers to develop individually and collectively creative scripts within their professional group

Regarding MUVE students' corporal and cognitive behaviour, the introduction of new digital technologies such as MUVE puts a new non-linguistic, bodily and visually learning dimension at the centre of users' experience, removing language from the dominant vector of the experience. Moreover, teachers are

becoming aware through their experience of the MUVE that extended learning between online and in-presence also implies an embodiment framework as a unifying perspective, considering that all psychological processes are influenced by body morphology, sensory systems, motor systems, and emotions (Glenberg, 2010; Schubert & Semin (2009).

Regarding technology in MUVE institutional change, an educational institution generates tensions between an old system of working and the new one, which needs to be accommodated and assimilated by all of the community involved (Jones & Issroff, 2007). At the same time, the students, teachers and all the administrative staff of the school, supported by the ITC office and also researchers in geographic proximity, need to make sense of the new technology alone and as a group, finding a new opportunity for learning and action.

Conclusion

The observation and data collected show that this experimentation with a MUVE extends and strongly transforms the learning space by giving teachers, students, parents and the whole educational team the opportunity to exchange, strengthen and build new ways of experiential learning (Jarmon et al., 2009) through projects, involving a wide range of experience (manipulation, social exchange, 3D object creation) from various disciplines. The originality of our work lies in the general application of the MUVE space in the school. We can consider how extended learning is enacted following a multilevel approach, with implications for organisational, collective, individual and territorial transformation. In order for expansive learning to take place, students, teachers and researchers need to be involved in collaborative actions, generating a rich exchange of practices enabling the transformation of the activity. The adoption of the Participatory Action Research, involving the students, the research team, teachers and ITC partners on a daily basis, enables this collective work oriented towards a critical change of practices, through continuous spirals of planning, action, observation, reflection and re-planning. These initial results will be further analysed in the longitudinal appropriation of the 3D MUVE by the school.

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