Virtual environments for academic writing.
A model in Minecraft

Entornos virtuales para la escritura académica.
Un modelo en Minecraft

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Abstract

The article analyzes the possibilities a virtual environment through a commercial video game presents for academic writing in university education. At the end of 2017, a mixed investigation was conducted in a single case study with a group of 28 undergraduate students; combined techniques of observation and information gathering (open questions, photographs in the virtual environment, field diary, system records), as well as measurement (Likert scale questionnaire) were used to account for the affinity and adaptability expressed by students in the conduction of the collective writing exercise in Minecraft. After having completed the exercise, the statistical treatment of the questionnaire allowed to establish the presence of the two proposed variables and establish correlations with the rest of the variables of the instrument. For this article, only a selection of the results of the questionnaire is presented —e.g. Affinity (0.522, 0.531) and Adaptability (0.508, 0.688) in the group independently of genre— as well as a selection of the complementary observation records. The findings point towards the relevance of the use of adapted videogames as platforms for academic writing in university training. This allows to think on extended uses of virtual environments for inter and intrainstitutional writing and publishing to develop academic literacy.

Keywords: Adult literacy, information literacy, virtual learning, higher education, writing, videogames.

Resumen

El presente trabajo analiza las posibilidades que un entorno virtual, mediante un videojuego comercial, presenta para la escritura y la publicación académica en el marco de la formación universitaria. A finales del 2017 se realizó una investigación mixta por medio de un estudio de caso único con un grupo de 28 estudiantes de licenciatura; se combinaron técnicas de observación y recolección de información (preguntas abiertas, fotografías dentro del entorno virtual, bitácora del investigador, registros de sistema), así como de medición (escala Likert) para dar cuenta de la Afinidad y la Adaptabilidad expresada por los estudiantes en la realización del ejercicio de escritura colectiva dentro del videojuego. Tras la realización del ejercicio, el tratamiento estadístico permitió establecer la presencia de las dos variables propuestas y establecer correlaciones con el resto de las variables del instrumento. Para este artículo, se presenta una selección de los resultados del cuestionario —e.g. Afinidad (0.522, 0.531) y Adaptabilidad (0.508, 0.688) del grupo independientemente del género— así como una selección de los registros complementarios de indagación. Los hallazgos en su parcialidad apuntan hacia la pertinencia del uso de videojuegos adaptados como plataformas para la escritura académica en el marco de la formación disciplinaria universitaria. Se abre la posibilidad de pensar en usos extendidos de entornos virtuales de escritura y publicación académica inter e intra institucionales para desarrollar la alfabetización académica.

Descriptores: Alfabetización de adultos, alfabetización informacional, aprendizaje virtual, enseñanza superior, escritura, vídeo juego.

1. Introduction and state-of-the-art

Creating the conditions for the access and participation of young people in the written subjects at the university is still a huge challenge for higher education institutions in Latin America. Complications in student´s performance have been attributed to inconsistencies in previous levels, and the problem requires other approaches to broaden the vision and enhance the interventions. The difficulties that students face whilst learning university literacy are not only because of the complexity of the new disciplinary and academic languages and practices (vs. the previous levels), but also due to asynchrony between traditional models of university academic learning in contrast to the many forms that cultural learning has outside these institutions.

It is necessary for universities to incorporate discussions that remark the richness that contemporary models of cultural learning linked to the new media ecology have for their own educational purposes (Gutiérrez & Torrego, 2018; Gil Gonzáles & Pardo, 2018; Alloza, Escribano, Delgado, Coneanu & Escalera, 2017; Ruiz & Díaz, 2016; Evaristo, Navarro, Vega & Nakano, 2016; Agramunt, 2016; Cordón & Jarvio, 2015; Pérez, 2014; Bezanilla, Arranz, Rayóhn, Rubio, Menchaca, Guenaga & Aguilar, 2014; Villegas, 2013), and use them as thoughtful and practical resources to reconstruct educational practice around academic literacy. The variety of digital literacy practices (Gros, 2002) from popular culture can help narrow the gap between students' academic literacy practices and the demands of academic literacy in the university.

The discussion of learning in virtual worlds using commercial video games as educational tools (Lacasa, 2013), based on video games and participation (Squire & Jenkins, 2011) and video games and mediation curriculum learning (Gros & Garrido, 2008), allows to establish the complexity of the challenge of training students and the potential presented by video games as alternatives to educational intervention in academic literacy. Since 2005, Shaffer, Squire, Halverson and Gee anticipated that video games have the potential to change education as it is known, as these can be used to take the education system beyond the traditional management of academic disciplines derived from medieval scholastics and incorporated in schools developed in the industrial revolution, towards a new model of learning through meaningful activities in virtual worlds in preparation for meaningful participation in the post-industrial and technologically rich real world.

For this research, Minecraft was chosen as its use allows the construction of new and relevant scenarios for training and learning in formal education through virtual reality (Karsenti, Bugmann & Gros, 2017; Nebel, Schneider & Rey, 2016; Craft, 2016; Castellanos, Castellanos, Salazar & Casas, 2016; Callaghan, 2016; Sáez-Lopez, Miller, Vázquez-Cano & Domínguez-Garrido, 2015; Cipollone, Schifter & Moffat, 2015; Bebbington & Vellino, 2015).

1.2 Constructivism, affinity and adaptability in virtual environments

For this research, the sociocultural approach of Vygotskyan origin was adopted (Vygotsky, 1986, 1978), which allows to address reading and writing as cultural processes that need to be developed in formal education. The concepts of Affinity Spaces (Gee & Hayes, 2012) and Adaptability (Barr, 2017) are also incorporated and are entrenched with the concept of Zone of Proximal Development as theoretical basis.

The digital age is creating new scenarios and new modes of interaction between the text and its receivers and writers. In this sense, new cultural practices are being generated and contribute to the development of activities that incorporate spaces of affinity (Gee & Hayes,

2012), creating new ways of participation in the digital culture.

Gutiérrez and Torrego (2018) state it as follows: affinity space is a concept that refers to the virtual place from which informal learning environments take place thanks to the inter- action with the rest of participants and the content. These environments (Jenkins, 2009), are flexible and experimental, and can change their organization to suit the needs and interests of those who use them, something that does not happen in traditional education systems, where students struggle with a participatory culture based on collective intelligence.

When using video games, people are facing a new multimodal and electronic textuality. The existence of multiple means of communication and the interrelationship established between them have given rise to a type of text that does not begin and end in a single medium, but is diversified and dispersed taking advantage of the characteristics of each medium, giving birth to a intermediate narration (Gil González & Pardo, 2018). In addition, the digitization of the media has allowed new ways of interaction among its users and has fostered the unusual development of a participatory culture like never before.

Despite its age, the validity of Vygotsky's contributions is evident today. For this research, the concept of the Zone of Proximal Development (ZPD) is used, which explains the distance between the level of development of the student (what he/she can do alone) and the level of potential development (what he/she would be able to do with the help of an adult or a more skilled individual). This concept allows to define the potential margin of incidence of the educa- tional action. For this research, it is in the ZPD where new ways of understanding and dealing with tasks and problems by the less competent participant can occur, thanks to the help and resources offered by their most competent peers , in this case, within a virtual environment. From this characterization, it is understood that what

the person is able to do with help in the ZPD at any given time, he/she will then be able to do it independently later: which can first be done at the social or the interpersonal level, may later be dominated and performed autonomously by the initially less competent participant (Onrubia, 1999, in Coll *et al.,* 1999).

Constructivist approaches to affinity spaces are related with Barr's findings (2017) on adaptability as an expression of cognitive skills (ability to perceive) and behavior (ability to adapt), using commercial video games as educa- tional tools. Adaptability is a challenge of today's education. According to Ramírez, Herrera and Herrera (2003), adaptability is the intellectual and emotional capacity to respond coherently to the demands of the environment; it is a dynam- ic process that adjusts and regulates behavior according to the environment. In addition, it encompasses a set of temporarily contextualized attitudes in pursuit of emotional well-being and personal satisfaction by which the student modi- fies his/her behavior patterns to self-regulate the prevailing conditions of the environment. In this regard, it is agreed that a rapid and effective adaptation of university students is essential to ensure academic success.

2. Methodology

After the methodological and theoretical review for the construction of the strategy and given the unrepeatable conditions of the selected group, an approach was built through a single case study (Yin, 2003) supported by Bisquerra´s Educational Research Methodology (2004), since it allowed to propose a comprehensive yet specif- ic scaffolding to investigate the presence of Affinity and Adaptability in a group of students when performing an academic writing and pub- lishing exercise inside a virtual environment, using a modified commercial video game.

The idea was to observe as well as to meas- ure hence the need to use this mixed approach.

The aim of knowing the presence of Affinity and Adaptability implied the need to build a virtual working environment based on the theoretical positions of constructivist learning, incorporating discussions on vernacular literacies in young college students. The design and implementation of this virtual environment through Minecraft to work on writing and publishing as social practices that accounted for affinity and adaptability also required us to create an instrument that would measure both variables or components and that would also allow to establish some inferences from the correlations between them and the rest of the variables of the instrument.

Therefore, the design of the research in its quantitative part was encompassed by a pre-experiment. Statistically, it was possible to validate the scales of the instrument, first by expert piloting and then by statistical exploration to provide enough reliability and validity on the presence of the two proposed factors, Affinity and Adaptability, and establishing relationships with the rest of the variables. As for the scope of the research, it was exploratory and analytical, because in addition to knowing the group and its characteristics, it was statistically possible to analyze the type of relationships between the proposed variables in order to explain their presence, complementing the analysis with the additional observation and inquiry records collected.

2.1. Subjects of study and brief narrative

The methodological and theoretical definitions described above, in addition to the possibilities of accessing to student groups and their specific conditions of academic literacy, determined the selection criteria and led to the selection of a single group: the 2014 generation of the Bachelor's Degree in Educational Processes of the BUAP School of Philosophy and Letters, which during fall (August-December) 2017, were undergoing the subject of Evaluation, Accreditation and Certification of Higher Education Institutions. A

pre-experimental design with a single observation group was used. This group of 35 students was convened by the professor of the subject who told them about the exploration that was going to be conducted. In the first face-to-face meeting with the group, the researcher informed them of the characteristics of the exercise and detailed the mechanics of participation and anonymity. At that same meeting, the researcher required the informed consent of the participants by personally creating their user profiles to enter the virtual environment.

What was the intervention? This research exercise was based on the work that the professor had been doing with the students during that semester. The students had previously read material on the subject, held group discussions, elaborated comparative and analysis tables, and written an essay on the subject. This intervention occurred just after having written that essay. Students had to write an abstract of their essay to share in the group. This is where the exercise was done as students were asked to write and publish their abstract in the Minecraft virtual environment so that it would be virtually presented to everyone else.

After writing and publishing the abstract, they were asked to read at least one of the abstracts and leave a feedback, using a rubric provided to them for such purposes. The rubric was prepared by the researcher and was provided to students inside and outside the environment to ensure its availability even when they were not connected. A modified version of Minecraft was used (to allow the publication of their abstracts) and students had access to it in the faculty's computer lab and on their personal computers outside school hours.

The abstract was prepared using in-game signs, and feedback was made by using books (it is an in-game object that allows writing) that were placed inside chests next to the read abstract. Once students completed the feedback, the exercise was finished. The exercise took place over a week, with three face-to-face meetings in

the computer lab, and multiple encounters in the virtual environment in and out of school hours. It is worth remembering that, although the aim of the students was to publish their abstracts and provide feedback to others, the purpose of the research was not to evaluate the abstracts but to be able to record what was happening with the students during the writing activity. Thus, the research aimed to value the social experience of writing in the virtual environment and not to evaluate the quality of the writings. The rubric provided to students, and the previous work done on the subject, ensured that the writing of the abstracts was indeed subject to an academic standard of publication. Students had to take care of their writing, their style, the use of quotations, and the general organization of ideas so that the abstract had a structure that could be reproducible. At the end of the intervention, only 28 of the initial 35 students completed the exercise in its entirety.

2.2. Identification of variables and validation of the instrument

The working hypothesis raised in the research established a causal relationship between the use of the video game and the presence of Affinity and Adaptability. Through the pre-experimental method we analyzed if the results could be explained exclusively through the relationship between these factors or variables. The available conditions led us to work with this methodological variable to propose a research that could be quantitatively explanatory, while also having other records of data and information obtained through other ways of observation of the single case with the group. Although the lack of a control group normally limits the statistical comparability of the instrument, the validation carried out first by conducting a piloting by experts and then by a statistical exploration to analyze the data, allowed to confirm that two dimensions or components were present and they became

indicators for the comparison with the other variables by analyzing their variances (Anova).

The final version of the instrument allowed to achieve an acceptable level of reliability with a Cronbach Alpha of .798, grouping 8 likert scale items into 2 components: the first consisting of 5 items named Affinity, and the second consisting of 3 items named Adaptability. The rest of the items functioned as contrast variables, either categorical or scalar. The instrument yielded consistent parameters for 1) accounting the two proposed components (Affinity and Adaptability) and 2) crossing them and the other variables of the study for describing the group and its characteristics, incorporating the records of other information collection techniques to broaden the spectrum of what was statistically observed.

2.3. Collection techniques and analysis of information

After the intervention, the two parts quantitative instrument was applied: the first regarding the general characteristics of the group and previous experiences of academic and digital literacy; and the second regarding the exercise carried out. The choice to work with a single group involved a limitation: the impossibility of testing alternative hypotheses . However, the statistical validation of the instrument made it possible to account for the changes reported in the dimensions in the observed group, and to complement it with the other observational records to have further elements for understanding the phenomenon.

As part of the single-case study, photographs were taken during the intervention in the virtual environment, server messages were logged by system log, in addition to the observations recorded in the researcher's log; all these observation techniques provided additional information on the Adaptability and Affinity developed during the intervention. In other words, it was possible to record a series of evidence that gave an account of the Affinity and Adaptability of the group, beyond what was

recorded by the questionnaire with the possibility of complementing it.

3. Analysis of the results

The analysis techniques of the instrument were various statistical treatments to which the different variables were tested against, such as Student T, Anova, KMO and Bartlett circumference, Exploratory factor analysis of main components, matrix comparison, variance analysis, Alpha Cronbach. These analyses were performed using the SPSS software in version 22.

An exploratory factor analysis was carried out, using main components and shared variances. Despite the variance of the error, a sufficiently strong association of the variables and variance explanation was achieved.

The instrument was developed under expert piloting and was also statistically validated. This statistical validation was first performed by free extraction of all statistical associations. It was assumed that it was not known whether correlations existed; using perpendicular methods, through a VARIMAX rotation sorted by size small values were supressed. This test allowed us to know how the defined factors were conformed and how exclusive they were from each other. When the measurement scale is above .700 it is assumed to be adequate. The sphericity test tells if the association data does not resemble the identity matrix. In this case, the identity matrix presented a significant difference with the correlation matrix, so it was valid to do a factor analysis since the factors were defined, and because there were factors, specifically two factors in this case. Dimension or factor 1 and dimension or factor 2 explained 61% of the variance, being an acceptable percentage.

The composition of these variables was expressed by the matrix of rotated components. After the refining from the saturation indexes of the variables shared in the components, component 1 was composed by 5 variables and component 2 by 3 variables. Thus, through component

validation, the 2 components that were intended to be observed, Affinity and Adaptability were constituted by grouping 8 measurable variables in the two reported components, yielding a reliability (Alpha of Cronbach) of .793.

The two components found after the application were converted to variables. With each component (named Affinity and Adaptability) converted into a variable, it was possible to establish correlations with other nominal and ordinal variables that were retrieved from the instrument. The crosses were made between the characteristics of the group and the Affinity and Adaptability recorded by the instrument. In each case, the values accounted for 1) the homogeneity of the groups using the Variance Homogeneity Test, where values greater than .05 would indicate that the groups are homogeneous; and 2) the Anova between the variances of the variables, where values greater than .05 would indicate that there are no statistically significant differences between the groups; therefore, the presence of the variables will be independent of the factors, in this case the characteristics of the group. After the statistical treatment was carried out, correlations were established between the variables by analyzing their variances (Anova), which were further supplemented by the information recorded through the other research techniques, which allowed establishing the following results.

3.1 Results[1]

After the variance homogeneity test and the Anova, the Affinity variable behaved as follows: it was consistently present in the group, regardless of: age (0.652, 0.149), gender (0.522, 0.531), semester (0.2, 0.095), reason behind career election (0.801, 0.549), and prior knowledge of the Minecraft video game (0.104, 0.168).

After the variance homogeneity test and ANOVA, the Adaptability variable behaved as follows: it was consistently present in the group, regardless of: gender (0.508, 0.688); reason behind career election (0.753, 0.406); difficulty assessment of video games as an activity (0.673, 0.231); difficulty assessment of the exercise (0.626, 0.380); and the opinion on the potential of video games for academic writing (0.762, 0.061).

Based on the above data and from the initial hypothesis stating *the use of a virtual environment from Minecraft impacts the Affinity and Adaptability of university students when performing a collective academic writing and publishing exercise* , it can be said that it is corroborated for the studied group. The limitations and scope of the methodological approach prevent us from corroborating alternative hypotheses, and although it is possible to account for the presence of the proposed variables, it is not possible to assert their generality.

Within its bias, this hypothesis check is important as a thoughtful and methodological benchmark for further research. It suggests the possibility of using various virtual environments through video games to work academic writing at the university. As recorded in this investigation, the affinity and adaptability of the group occurred during the intervention, and its presence can be explained independently of certain group characteristics.

With regard to the objectives of the research, these were met to the extent that it was possible to: 1) Enable a virtual environment using Minecraft and conduct an academic writing exercise with university students to observe, measure and analyze affinity and adaptability; 2) Design an intervention methodology through a virtual environment using Minecraft that allows academic writing to take place; 3) Develop an instrument to measure the application of the virtual environment and its impact on the proposed variables; 4) Account for students' experiences with academic writing and digital literacies

during their university education; 5) Describe the characteristics of the group of students with respect to Affinity and 6) Describe the characteristics of the students with respect to Adaptability.

The researcher's logbook allowed the recording of data and events that escaped from the other records but that allow quantitative findings to be robusted. A selection of the findings from this record is presented below.

Some students created their own techniques for writing/migrating their summaries to the virtual environment. Most students had prepared their summaries in word processing in advance, but the task of bringing them into the virtual environment was not so simple. The boards in Minecraft could contain up to 600 characters spread over 15 lines, a total of 40 characters per line. Students reconfigured their abstracts, and in some cases, modified the wording to create their lines of text, and then just insert them directly into the game. One of the advantages of using the PC version of Minecraft is to be able to go from one application to another and take advantage of the copy and paste shortcuts between applications that use writing. Therefore, several students created a kind of text transcription document, i.e., a document in Word that served as a template to segment the lines of their paragraphs to the right size for the game, and then just copy and paste it in the environment. These new uses of the same word processor account for students' adaptability to ingeniously solve new academic and digital literacy challenges.

During the working sessions in the computer lab, the closeness of the computers allowed for two types of interaction between students. One in the virtual environment using the chat (text conversations), and one on the outside, face to face, i.e., students supported at each other in the physical environment, while leaning in the virtual environment.

With the information recorded in the logbook, it is possible to assess   processes of Adaptability and Affinity on the part of the stu-

dents: the creation of the transcription documents between Word and Minecraft; the disposition of students to attend virtual and real life sessions outside school hours; and the fellowship and support between each other during the encounters.

4. Conclusions

It was possible to know the effects that a virtual environment tailored for academic writing (through an adapted commercial video game) had on the affinity and adaptability of students who study at the university. In addition, the instrument allowed some comparisons to be made between these two variables and the rest of the variables used.

From an innovation point of view, the research promotes a novel use of digital technologies, known as video games, to work academic writing in the university enhanced by virtual reality, i.e., it provides an idea that given certain conditions of academic literacy, using technologies like Minecraft, can allow processes that in addition to developing affinity and adaptability, allow learning in new, more flexible and relevant modalities. The idea here is to spread the notion of enhancing academic writing by using affinity spaces made possible by videogames and other digital resources from the current media ecology, as aids to develop academic and disciplinary literacy.

The most important results are directly related to the verification of the presence of Affinity and Adaptability in the group of students when performing the writing exercise in the virtual environment, regardless of its general features. This is promising since it allows to imagine new applications of this working format in other groups with other features, assuming that the affinity and adaptability of the participants will continue to be positively impacted.

The multiple positive reactions collected in this research allow having an idea about formalizing and expanding the offer of this type of virtual working environments in other subjects in the bachelor's degree, and even transferring it to all areas of knowledge at the university.

It should be emphasized: the use of digital environments is not meant to replace interactions in the physical world, nor does it imply the non-use of analog tools or local offline processes, on the contrary, it must be assumed that the use of virtual environments works rather as extensions of academic literacy processes already set in motion. To the extent that the practice scenarios of interdisciplinary academic literacy are strengthened, mastery and control will be gained by students over their participation in the development of scientific ideas for humanity.

Being a literate person can only mean to be prepared to participate in the construction of the locations shared with others. Being a digital literate is therefore an imprint on the formation of citizens (Area, 2015). Within universities, the training scenarios of young people must be strengthened so that they can recognize their individuality and undertake a commitment of inclusion with the society they are part of (Villegas, 2013), to make decisions, to reach agreements and to raise questions. Therefore, the university has the challenge and the honor of fostering literate people, i.e., people who can make informed and critical decisions about the processes, contexts and situations that are common to them. The students who participated in the exercise, stated mostly to have moved from confusion and anguish at the unusual virtuality of the task, towards satisfaction and the ability to recognize themselves and act/create collaboratively in the virtual environment. From the Vygotskyan perspective, this transition would correspond to the one that occurs along the Zone of Proximal Development (ZPD).

If the results of this research are any indication, virtual environments can provide new ideas to work university writing, while generating environments that develop the adaptability and affinity of young people. After all, affinity and adaptability are but natural consequences of the learning processes of people.

Through virtuality, it is possible to strengthen the formative processes around aca-

demic writing, and to empower young people to develop their creativity and their critical capacity. As professors of the digital age, we cannot but embrace the possibilities that virtuality presents for our formative pretensions. The idea is not to create individuals who settle without thinking, but to contribute to the personal growth of each person in a group, so that they can own their decisions, and create their interconnected fates.

It is then necessary to carry out new educational processes in Latin America, along with the existing processes, to strengthen the formative scaffolding of young students. The commitment and challenge being faced in the Latin American public university is undeniable. Young students will have the responsibility of continuing the social institutions that guarantee the collective well-being. Thus, taking on virtuality in public university can strengthen processes, channels, and mechanisms for that to happen.

5. Images and figures

Photo of the virtual environment showing a page of one of the 28 abstracts

Resources for constructing the writing virtual scenario
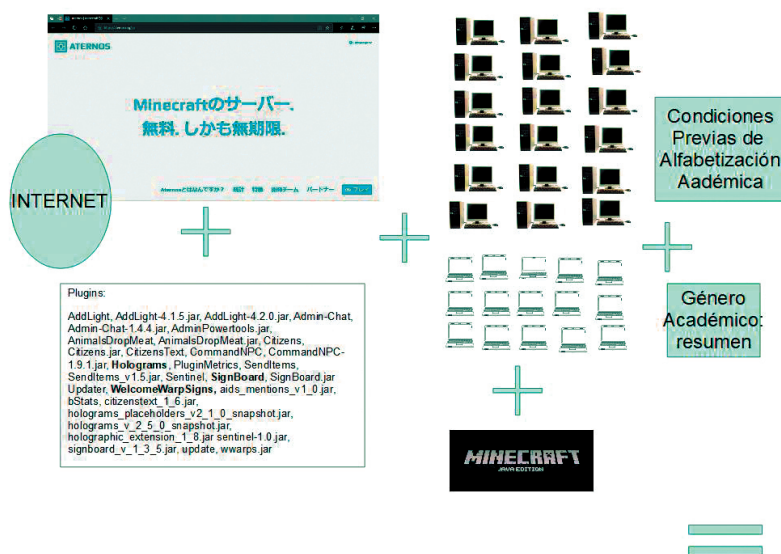
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