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Gamification

Gamification allows the use of elements of the dynamics of games in the educational reality to achieve the learning objectives set through the use of different techniques and resources. In this way, a ludic and active approach is given to the teaching-learning processes where the students have a leading and participatory role while, at the same time, obtaining a fun, motivating, and positive learning experience.

Editorial

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Gamification is incorporated into the educational field as a pedagogical trend that has increased exponentially due to the use of digital devices and the incorporation of games in portable formats among students, promoting ubiquitous learning. Some characteristics of learning increased by and in the post-digital society and its applications mean that, through gamification, the use of game elements that are discovered as a spiral of an activity, a practice, or a training proposal with a clear final intention are suggested. It involves establishing a specific objective, which should be the focus in analog and digital learning environments, in order to make proper use of gamification.

In the specific context of the educational world, there are many practices in which gamification has already achieved great success, either because it has reached a high degree of acceptance in its extrinsic motivation system (where rewards do their job of motivation and encouragement very well), or because the simulated environment that is provided generates a sense of security for the students.

A methodology where the technological and the digital acquire a fundamental role in carrying out these practices, but which curiously is presented as a strategy that does not inexorably need them, since it can be developed from an analog level without any difficulty. All these aspects give gamification a wide range of possibilities that, through its priority themes (gamification in education, results from gamified experiences, gamification, and transmedia narrative, among others), will reflect advances in gamified learning processes, training plans, experiences, design, and results of gamified methodologies, and research in which this strategy is the central object of study.

From this monographic issue of the «Alteridad Journal», the team of editors wanted to deepen and inquire on the reflections, studies, and conclusions with the purpose of generating a framework from which to analyze the experiences of educational innovation in educational settings; from the deepening in the concepts, definitions, characteristics, and classification of gamified educational actions, to the implications which can be extrapolated in the digital training of teachers or students.

With the enthusiasm of contributing to the training of educators and researchers interested in this methodology, the Monographic Section “Gamification in learning: Methodological strategy for student motivation” is structured around five manuscripts. Under the title “Gamification, “I have no idea what it is”: a study in the Initial Training of Physical Education Teachers”, the authors De Sousa, De Lima, and Reis, through a qualitative study, try to identify the most relevant elements in initial training teachers (PEFI), highlighting among its most significant results that the association of gamified actions with digital technologies enhances the development of education in digital culture. The section continues with a quantitative analysis of a gamification experience using three different

strategies: PET Triad, Story Telling, and Escape Room. From the article by William Reyes, entitled “Gamification and collaborative online learning: an analysis of strategies in a Mexican university”, it is highlighted that the three strategies had a significant impact on collaborative learning and that these are decisive for achieving online collaborative learning. On the other hand, and from the training of university teachers, gamification is addressed from the university to achieve and develop optimal skills that benefit students, both personally and professionally, where the perception of the methodological strategy was studied from a Latin American university through the Technology Acceptance Model (TAM). Martín, Palacios, and Gallego present under the title “Do we play or gamify, the evaluation of a training experience on gamification to improve the digital skills of university teachers” how all the participants perceived this appropriate strategy, highlighting dimensions such as: ease of use in the classroom, integration, transformation of interest in learning or ability to show a positive attitude in its use.

If there is an area that presents great difficulties when it comes to assimilating concepts, it is probably mathematics. Thus, a multi-case study called “Perception of gamification strategies in Italian secondary schools” combining quantitative and qualitative techniques, and with a sample of 4845 students, plus 12 teacher interviews, yielded very interesting results such as the fact that the students barely perceive the use of games, analogical or digital, by teachers, and at the same time, they state that they have little knowledge about gamification and its possibilities. That is why Malvasi and Recio point out in their conclusions the need for a solid training of students and teachers to optimize the possibilities of gamification in educational settings.

Lastly, from the incorporation of educational applications and the use of mobile devices to the gamification strategy, the study, under the title “A mobile app enhances the motivation of students in a university gamification experience” describes the «\$in TIME» application designed ad hoc with the intention of managing the different elements that made up the gamification project based on the film «In Time» in university spaces.

We hope, as happens to the thematic editors who have had the privilege of being part of this issue, that it will become a point of reference for researchers and teachers who are interested in identifying good educational practices linked to the strategy of the gamification, allowing you to advance in obtaining future results and conclusions that have a direct or indirect impact on the exercise of your teaching and research practice.

The Miscellaneous Section includes various topics related to education, in particular, with learning such as service-learning, learning in the context of COVID-19, social interaction between teachers and students, motivation in learning through the use of ICT and the incidence of visual fixations in text comprehension. The article “Service Learning in Higher Education between Spain and Mexico. Towards the SDGs”, deals with a current and interesting topic, giving an account, on the one hand, of the philosophical and pedagogical foundations and the models that support it; and on the other, of the experiences designed by some Spanish and Mexican universities, applied by students in vulnerable social sectors linked to children, adolescents, youth, women, indigenous communities, among others. The result of these learning experiences in real contexts not only generate motivation and personal growth in students, but also their social commitment, aimed at the progressive achievement of the SDGs. The article makes visible the possibilities that APPS offers to articulate theory and practice in university education, as well as to strengthen and give more coherence to the work that universities carry out in the field of linking with society.

In the context of the COVID-19 pandemic, knowing how to assess learning has become very relevant. The article “Monitoring learning in Chilean public schools in the COVID-19 context” tries



to respond to this problem that some researchers call emergency teaching-learning process. This research provides the opportunity to think about the conditions of learning and evaluation in remote education. The in-depth interviews conducted with school managers show the diversity of concepts and purposes of monitoring, its systematic nature, and the concentration of communication on social networks such as WhatsApp and email, as well as the difficulties in addressing the diversity and uniqueness of each student.

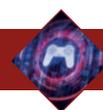
With the purpose of analyzing how the school and, in particular, the teaching staff contribute to the autonomous and dynamic formation of the student body, the article “Interaction, dialogue and practices in high school” proposes the case study of a public school in Ceilândia (Brazil), with a high level of vulnerability due to socioeconomic issues, violence, family problems, teenage pregnancies, and drug addiction. The triangulation between documentary analysis, semi-structured interviews, and participant observation allows the identification of various circles of exclusion; and proposes pedagogical strategies based on active methodologies, in which the students, in a resilient manner, become protagonists of their own learning.

Based on the conception that motivation is the engine for learning, the article “Motivational study on learning religion in Basic Education through ICT” seeks to identify the causes of demotivation in learning religion in an institution of Basic Education. The results of the study carried out with 268 students and eight religion teachers show low motivational levels due to deficiencies in the learning environments and the use of traditional teaching methodologies; to increase motivation, the use of participatory methodologies mediated by ICTs is suggested.

The article “Visual fixations and characters: incidents in the understanding of expository texts” completes the miscellaneous section. Reading comprehension has several social, cultural, and emotional factors that can increase or decrease its levels and influence motivation for learning. Among them, visual fixation is analyzed in an original manner in this study. The research is carried out with the participation of 80 high school students, who read three texts related to electromagnetism on the Eye tracher T.120 screen, the number of fixations is analyzed using the Tobii 3.4.6 software. The results indicate that visual fixations play an important role in reading comprehension since information enters through sight.

This issue of *Alteridad* closes with the following question: Can we talk about post-pandemic education? Two years have passed since the start of COVID-19 and there is still no unified scientific answer about the behavior of the virus and people; and, consequently, any planning becomes emergent and circumstantial. Although, on the one hand, the use of ICT for the teaching-learning process has increased considerably in an innovative way; on the other, the pandemic has revealed that not all families have cell phones, tablets or computers, let alone the internet. In this context, various challenges arise for education: how and when to help students who dropped out of school to return to their studies? Is the hybrid modality here to stay? Are the various Apps valid and reliable?; what to say about the curricular flexibility, the validity of the online evaluation, the academic quality with which the new professionals graduate. There are more questions than answers, which we hope we can solve together teachers, researchers, students, computer scientists, psychologists, sociologists, politicians, among others. We hope that *Alteridad* becomes that space for discussion to debate the new challenges.

Teachers and researchers are invited to submit articles for the next issue on “Teaching and learning mathematics: different approaches and educational levels”. The Call will be open until February 28, 2022.



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Monographic section

(Sección Monográfica)

“Gamification in learning: a methodological strategy to motivate students”

La gamificación en el aprendizaje: Estrategia metodológica para la motivación del alumnado





Gamification, “I have no idea what it is”: a study in the Physical Education Initial Teacher Training

Gamificación, “No tengo ni idea de lo que es”: un estudio en la Formación Inicial del Profesorado de Educación Física

Dr. Diego de Sousa Mendes is a professor and researcher at Universidad Federal de São João del-Rei (Brazil) (diegomendes@ufsj.edu.br) (<https://orcid.org/0000-0002-2297-5883>)

Dr. Marcio Roberto de Lima is a professor at Universidad Federal de São João del-Rei (Brazil) (marcinholima@ufsj.edu.br) (<http://orcid.org/0000-0003-3790-1104>)

Tamara Aparecida Reis de Freitas is a professor at Universidad Federal de São João del-Rei (Brazil) (tamarinhafreitas22@gmail.com) (<https://orcid.org/0000-0001-9774-8696>)

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Abstract

The implementation of didactic strategies that involve the imbrications of elements and specific languages of digital culture in the context of teacher training is an indispensable condition for the renewal of contemporary pedagogical action. This research aimed to identify relevant elements in a teaching process developed with 24 teachers in initial training (TIT) regarding gamification. This study consolidated a Case Study structured from the pedagogical experiences developed during the “Physical Education Teaching Methodology III.” The empirical data were produced through classroom observations with records in a field diary and digital audio recordings of debates held, which were transcribed. This corpus was submitted to a Content Analysis mediated by the ATLAS.ti software. The results indicated that the learning process about gamification developed from the experience of creating gamified classes. The presence, emphasis, or absence of certain game elements revealed the understanding that the TIT group established concerning thematic. It is also noteworthy that the association of gamified actions to digital technologies boosted education development in digital culture. Finally, the experience is undertaken forged possibilities of meaning and learning by assuming communication and reflection as mediating elements of gamified pedagogical actions.

Keywords: Gamification, teacher, training, teaching, education.

Resumen

La composición de estrategias didácticas que impliquen la imbricación de elementos y lenguajes propios de la cultura digital al contexto de la formación educativa es una condición indispensable para la renovación de la acción pedagógica en la contemporaneidad. En este sentido, esta investigación tuvo como objetivo identificar elementos relevantes en un proceso de enseñanza desarrollado con 24 profesores en formación inicial (PEFI) en relación con la gamificación. De naturaleza cualitativa, este estudio consolidó un Estudio de Caso estructurado a partir de las experiencias pedagógicas desarrolladas en el componente curricular “Metodología de la Enseñanza de la Educación Física III”. Los datos empíricos se produjeron a partir de observaciones de las clases con registros en un diario de campo y grabaciones digitales de audio de los debates, que fueron transcritas. Este corpus fue sometido a un Análisis de Contenido mediado por el software ATLAS.ti. Los resultados indican que el proceso de aprendizaje de la gamificación se desarrolló a partir de la experiencia de crear clases gamificadas. La presencia, el énfasis o la ausencia de ciertos elementos de juego fueron indicadores de la comprensión que el grupo de PEFI estableció respecto al tema. También cabe destacar que la asociación de las acciones gamificadas con las tecnologías digitales ha potenciado el desarrollo de la educación en la cultura digital. Finalmente, la experiencia se realiza forjando posibilidades de significación y aprendizaje al asumir la comunicación y la reflexión como elementos mediadores de las acciones pedagógicas gamificadas.

Descriptor: Gamificación, formación, docente, enseñanza, educación.

1. Introduction

The forms of contemporary sociability have been reshaped through the mediation of Digital Information and Communication Technologies (ICT). New formats of access, use and production of information are diverse with these technologies, expanding mobile communication, ubiquitous computing and social (inter)action in cyberspace.

This socio-technical scenario typifies digital culture (Lemos & Lévy, 2010; De Barros, 2019; Lemos, 2020), which, from the intensive use of digital technologies in network, causes changes in all sectors of human activities. This whole range of transformations is not determined by digital technical devices, but it is conditioned by them; hence, we admit the existence of many challenges involving ethical, socio-economic, digital inclusion, security of personal information, behavioral prediction, etc.

In this field, we understand the urgency of the composition of strategies that involve the imbrication of elements and languages typical of digital culture to the context of educational training with the aim to show these spaces as inclusive and promoters of inclusion in this culture. It is a position that accepts the thought that education is also driven to reconfigurations and needs to be compatible with digital culture, being essential to understand these transformations and to develop other forms of education (Lima, 2013).

Therefore, we focus the attention to initial teacher training, seeking to bring it closer to a strategy derived from the language and design of games called gamification. Initially, we note that "[...] gamification consists of the use of typical elements of games (challenges, collaboration, problem solving, continuous feedback, etc.) in contexts other than games" (Carvalho & Lima, 2019, p. 1204). In this sense, we understand electronic games as expressive cultural products of digital culture, and can contribute to the creation of "[...] spaces of learning mediated by challenge, pleasure and entertainment" (Alves et al., 2014, p. 76).

Because of the latter, a group of teachers in initial training (TIT) was proposed a pedagogical experience to bring them closer to gamification. This experience occurred in 2019, from a curriculum component of the undergraduate course in physical education at the Federal University of São João del-Rei (UFSJ). TITs were proposed to produce and analyze collectively a didactic unit focused on high school students, which were subsidized by the foundations of gamification as a teaching strategy. Our research problem was to investigate: What elements were relevant in a teaching process developed with teachers in initial training in relation to gamification?

1.1. Gamification and teacher training

The term gamification was first used in 2003 by the British computer programmer and inventor Nick Pelling, with the aim of applying game design concepts to "[...] make electronic transactions fast and enjoyable" (Nanodome, 2011). However, only in 2011, the concept begins to stand out in order to add value to various categories of business and learning (Alves, 2015).

Although there are different concepts for gamification (Apostol et al., 2013; Kim, 2011; Deterding et al., 2011), we assume its concept as the "use of mechanics, esthetics and the concept of games with the aim of providing commitment among people, motivating actions, encouraging learning and promoting problem solving" in non-playful scenarios (Kapp, 2012, p. 336, own translation).

For this purpose, elements present in games are systematically incorporated into non-recreational situations. There are many definitions of game elements that are explicit in the characterization of the gamification process (McGonigal, 2011; Zichermann & Cunningham, 2011; Werbach & Hunter, 2012; Kapp, 2012). These include goals, objectives, characters, rules, feedback systems, levels and stages, achievements, badges, etc. In this study, we considered the definition of game



elements by Werbach and Hunter (2012), who organize them into three general types: dynamics, mechanics and components. Dynamics refer to the more general and abstract elements, which are not directly part of the game but create the environment. Mechanics are objectives and guide the players' actions in the desired direction, delimiting what the player can or cannot do in the game. The components are specific apps visualized and used in the game interface.

Gamification in education involves the development of didactic strategies that promote transformations in the teacher and student. For teachers, gamification interferes with the way teaching content and dynamics are organized and is planned in a way that encourages the incorporation of interactive and stimulating learning resources, which may involve the enhancement of the technologies and languages of digital culture. By designing more evocative learning spaces for students, they are expected to engage in problem-solving, making sense of what they do and learn.

In particular, a gamified action extrapolates the posture of passivity/receptivity, requiring participants to move toward the achievement of learning objectives. In this sense, the collaborative and cooperative aspects of games can integrate gamified planning and promote the formation of collective intelligence (Lévy, 2007). As explained by Alves et al. (2014, p. 81) in "[...] gamified actions that require collaborative practices, Lévy's concept of collective intelligence is reinforced since players need to interact, exchange experiences and knowledge to perform a particular task."

Gamification in an educational context is not based on prescriptive and/or conditioning formats, leading to the overvaluation of a system of rewards against stimuli. On the contrary, we argue that gamified strategies can foster reflective processes that allow participants to take a critical stance on what they learn and even on their own intervention in the teaching process. In addition, we also understand that:

Characteristics such as the distribution of activity scores, the provision of feedback and the promotion of project collaboration are the objectives of many pedagogical plans. The difference is that gamification focuses more to achieve similarity with games. (Fardo, 2013 p. 63)

In this sense, according to Alves et al. (2014), a gamified activity should include the following aspects in its planning: (i) teachers know, experience and use the games; (ii) adapt the actions to the participants; (iii) define the scope of the referential contents, the skills to be developed, as well as the attitudes to be promoted; (iv) understand problems that can be explored as narrative and/or gamified contents; (v) define the objective of the gamified strategy by considering its adherence to the defined scope; (vi) construct a narrative, considering its compatibility with the topic and context; (vii) define the platform(s) and resources (physical/virtual rooms, electronic messengers, equipment, etc.) suitable for the development of the topic and the actions; (viii) design tasks and dynamics for their achievement.

Therefore, we understand that the typical elements of game design, when incorporated into educational dynamics, can help structure the teacher's work and improve student's performance, making learning more effective. The use of gamification in education does not guarantee a change in behavior in terms of learning and commitment. We also know that gamification is not a single and definitive solution to educational problems, which involve infrastructure, the assessment of the teaching career and the reconfiguration of training processes, among other aspects.

2. Methodology

The research carried out was qualitative (Bogdan & Biklen, 1994; Minayo, 2012), with a case study (Yin, 2015; André, 2005). The study involved 24 teachers in initial training (9 women and 15 men). The subjects collaborated spontaneously with the



research, having been informed from the beginning about their procedures and objectives.

The experience was carried out in the curriculum component of Methodology of Physical Education III teaching and included the development of ten sequential classes, called pedagogical interlocations (PI). Prior to the development of the workshops, there was a first phase of the study — Phase 1 — consisting of a Preparation Period, in which the theoretical studies were collectively developed and a script with the theme and objective of each of the 10 PIs, allowing the work to culminate in the sequential planning of ten (10) coherently articulated classes. Stage I lasted a month, with twice-weekly meetings of 50 minutes each.

Phase 2 dealt with the organization of the workshops. At this stage, PI was based on gamification aimed at high school students, and was

presented in written work plans. The curriculum content chosen for the experiment was Parkour¹, and TITs collectively organized ten class plans. TIT was organized into five working groups, each of which presented a seminar. The second stage had the same duration and temporary organization as the first.

The third phase dealt with the application and analysis of PI. PI was presented and discussed in five consecutive weeks, with two-hour weekly classes. The established dynamic provided that each group would act in three roles throughout the seminars 1) Instructors: responsible for the implementation of two sequential PIs in a single day; 2) Evaluators: analyzed the PI performed by the group of teachers of the week; 3) Participants: acted as high school students of the implemented PI. Table 1 shows how the work was organized:

Table 1. Organization of the work of the groups in the discipline

Week Group	Week 1	Week 2	Week 3	Week 4	Week 5
Group 1	Instructors	Participants	Participants	Participants	Evaluators
Group 2	Evaluators	Instructors	Participants	Participants	Participants
Group 3	Participants	Evaluators	Instructors	Participants	Participants
Group 4	Participants	Participants	Evaluators	Instructors	Participants
Group 5	Participants	Participants	Participants	Evaluators	Instructors

Own elaboration.

The discipline meetings were organized so that, in the first class of the week, the group of instructors would conduct their PI, and in the second class of the week, there would be a collective discussion coordinated by the group of evaluators.

The data were collected between September and November 2019, considering the stages of "Preparation, Organization, Implementation and Analysis of PIs" developed by the TIT. Data collection was carried out through classroom observations, field journal records and digital

audio recordings of the discussions held, which were subsequently transcribed.

Data analysis was performed using Bardin's Content Analysis (CA) (2016), with a Thematic Categorical organization, with the support of ATLAS.ti software, version 7.5.7.

Content analysis (CA) is organized methodologically in three stages according to Bardin (2016): (i) Pre-analysis; (ii) Material exploration; and (iii) Treatment of results, inference, and interpretation. In our study, a careful reading of the field journals and transcripts of the discus-



sions were carried out during the pre-analysis phase to identify the main issues raised. Each section of the journals and transcripts of the discussions was organized by date and incorporated into the ATLAS.ti software. The software hosts the primary sources in a file called Hermeneutic Unit, and the sections of this corpus were identified with an acronym: D1 to D6. Transcripts were identified by T1 to T6.

The exploration phase of the material allowed references by means of index registration or codes as mentioned in ATLAS.ti. These are key words that indicate the nuclei of significance relevant to the study and that are produced

from the corpus, avoiding a priori perspective. The indexing job added 32 codes.

Subsequently, the context in which each code was used was verified, which in the CA is called context units. In ATLAS.ti, context units are referred to as quotation, which allowed to verify the semantic context in which codes were used.

It was then possible to organize codes into groups with a common core of meaning. According to the CA, in the software these groups are called Family and constitute the empirical categories of analysis. In total, three empirical categories were formed to encompass the meanings of the TIT:

Table 2. Empirical categories

	Category title	Contents
Category 1	Learning to understand the elements of gamification.	Presents the TIT's understanding of the elements of gamification
Category 2	Interfaces between gamification, ICT and digital culture	Refers to the interface of gamification with digital culture and the presence of digital technologies in action
Category 3	Theoretical-practical relationship under debate	The tension between theory and practice from a critical and creative exercise

Own elaboration.

3. Results and discussion

We identified that TITs initially did not know what gamification was, expressing phrases such as: "I have no idea what it is," "I don't know," "I think it is something related to the use of video games in class. But how would this be?" (D1, 09/28/2019). Their association with the use of video games in classes was also evident, indicating the importance of giving visibility to the understanding of gamification in the initial training of teachers, as already noted by Martins and Giraffa (2015), explaining their theoretical-methodological concepts, as well as their distinc-

tion of the act of playing, creating educational games or even the inclusion of electronic games in routine and educational processes.

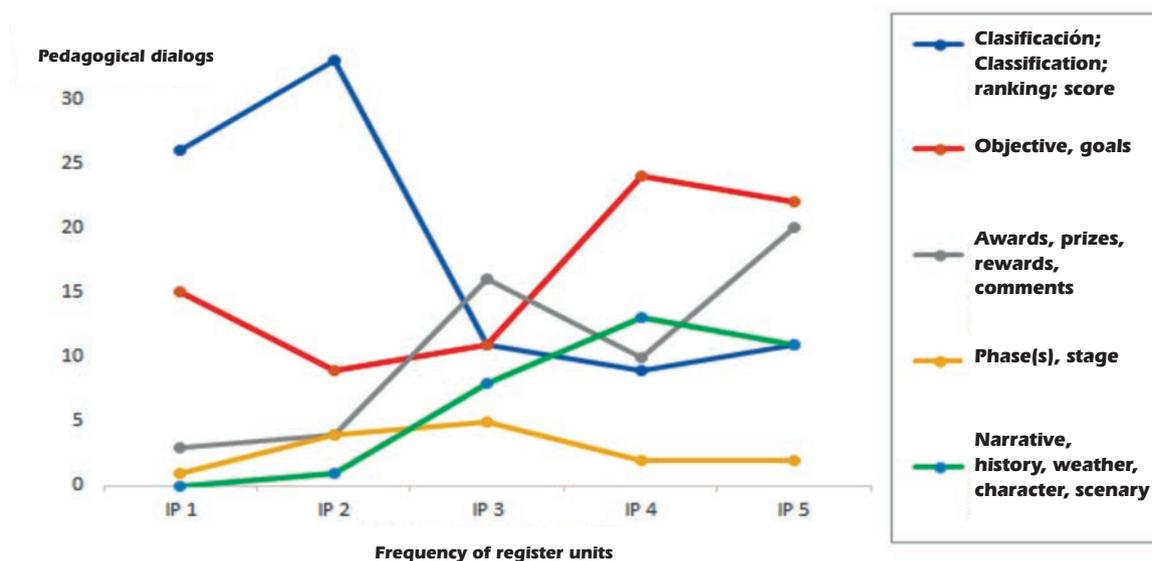
Despite an initially limited understanding of gamification, our records indicate progress in the actions and manifestations of those investigated, who were aware of the term no longer as synonym of "use of electronic games" in the context of school actions, but as a possibility of creative transposition of game design elements into various situations, especially for the organization of school educational devices. The elements that support this re-significance were constituted from the following categories.



3.1. Learning from understanding the elements of gamification

We observed a gradual appropriation of certain game elements by TITs that characterize gamification in PI, as shown in Figure 1.

Figure 1. Frequency of gamification elements in pedagogical dialog



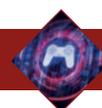
Own elaboration.

The graph shows that TITs overvalued the scoring systems compared to other potential gamification elements at the beginning of the interlocutions. Throughout the seminars, the establishment of clear and cohesive objectives in classes was improved. The presence of narratives as driving axes of teaching experience and as symbolic elements responsible for provoking commitment in students was not initially used by TITs. However, it was one of the elements of games that was most used at the end of the experience, which seems to indicate that this component made sense, was better understood and mobilized in the context of the gamified classes, as indicated by the highlighted passages:

TIT11: I liked the story with lava in the class... It is present in many games and is a different way to be more dynamic. (T4, 11/27/2019)

TIT15: This last class, of the groups catching the critical parts along the way, that you collect and form the keys to open a chest and find in that history the zombie virus, was very good. [...]. (T4, 27/11/2019)

The use of consistent goals and objectives that guide actions and various feedback systems that are not focused on mere competency or score/point quantification, but on the use of badges, awards, rewards, were also gamification elements that were virtually non-existent in the first classes, but were associated with Parkour teaching situations in a creative and increasingly frequent way. According to one of the included TIT's:



TIT 10: Whether we like it or not, we were working in all classes with the approach that was the ranking, the score, [...] now I liked the feedback of the activities made... [...] What we see in gamification is that each game is a problem, a challenge to overcome, to conquer, a goal. [...] I think they cleared the idea of rescuing the flag. [...] Another mechanic that seemed great to me, the one you used, is to divide lives, right? [...] Scattered bonuses. (Q4, 11/27/2019)

Finally, the resource of the learning phases or sections was also present from the beginning of the seminars; however, in a more stable and subtle way, without much emphasis, each of the lessons created by TIT constituted the acquisition of a further level of complexity of the theme developed.

During the practical seminars, students understood more broadly the gamification process with debates between individuals and teams that advance stages and were rewarded with gifts and points. These components can be imposed in gamification processes, but they do not assure them. On the contrary, they can reaffirm conventional didactic forms and strategies of traditional teaching systems, such as the emphasis on contextualized non-educational activities; the overassessment of the linear progression system (phase or series, school years, cycles, etc.), and the objective of actions through strictly quantified feedback— final ratings (in any sense that the word uses—either as a circumstance that ends with another or even as a synonym of reason, reason for being; objective; intention).

In this sense, Santaella et al. (2020) point out that gamification processes sometimes limit the notion of gambling to a behavioral approach: as a strategy to motivate individuals and increase productivity, whether in business or educational relationships.

Therefore, the learning process was driven centrally by experience (Bondia, 2002; Schell, 2011) with the creation and gamified experience, in which the presence, emphasis or absence of

certain elements of the game acted as revealer of the understanding established by TITs regarding gamification. The experience helped TITs to learn, becoming an element to elucidate ideas, making the concepts observable in their materiality, circumventing the abstraction that sometimes results from textual learning only in teacher training.

3.2. Interfaces of gamification, ICT and digital culture

Another core of significance found relates the presence of Digital Information and Communication Technologies (ICT) in experience. In four of the five classes of the workshop, TIT's teacher groups used mobile phones, digital applications, geolocation, digital maps, filming and photographic recording of activities and classes, establishing a consistent interface between the gamification process and the devices of digital culture.

For TITs, the use of ICT was essential to achieving gamified practices and actions, because these resources helped to build an environment, a game esthetic, referring to the symbolic construction of what Huizinga (1996) called the magic circle. Thus, as specific resources were used, the feeling of being immersed in a gaming environment was amplified. In this sense, speeches such as:

TIT 08: **With this mobile music** [emphasis added], this even looks like one of those video games that my daughter likes. (T5, 11/12/2019)

TIT 02: Actually, **the use of mobile phones and QR codes** [emphasis added] was great. (T1, 05/11/2019)

TIT 03: My assessment regarding your class yesterday, [...] there are very interesting items that you used, gamification resources... the theme of **Google Earth maps** [...] **the feature of cameras** [emphasis added] it was very good! We could see people repeating the



moves, [...] everyone had the feeling of playing a real game. (T1, 05/11/2019).

These conversations show that the presence and use of ICT in workshops were in most cases related with value contexts of these technologies in gamified actions. It does not mean that gamified situations can only promote more immersion and commitment in their participants if they rely on the use and presence of ICT. As noted in the study by Pimentel et al. (2020), we recognize that making a gamified proposal does not mean using digital games or Digital Technology (DT) in learning contexts. As the authors say, "gamification can be done without using digital devices" (Pimentel et al., 2020, p. 8). However, in our study, such resources provided the setting, meaning, and creative association beyond their most instrumental dimension, promoting what Brown and Cairns (2004) called a gradation of immersive gaming experience, in which players gradually move from a situation of little dedication of the game to the engagement, the total immersion.

Our data prove that the association of actions dedicated to the use of ICT has improved the perspective of education in the digital culture during the training of teachers. After all, as Pimentel states (2018, p. 78), gamification can "involve and motivate people with the aim of learning through interactions between people, with technologies [emphasis added] and with the environment". Adopting, therefore, what Pimentel et al. (2020, p.10) consider an articulation between gamification and "the concept of technology in a critical vision of the man-technology relationship".

An example can be drawn from the first thematic seminar, which explored gamification and its relationship with digital culture through mobile phones and QR codes². Initially, the aim of the class was to introduce the Parkour modality. To do this, in the surroundings of a multi-sports track, several QR codes created by the TIT group of instructors were scattered and placed

in areas where players had to move using some basic skills required sports, such as climbing, jumping obstacles, etc. to access them in a certain time. To get the QR codes, participants had to explore and interact with the space, overcoming obstacles with body movements in a creative, agile and safe way.

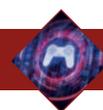
QR codes contained information such as curiosities, rules, historical facts and descriptions of specific movements about Parkour. This activity with the ICT was associated with gamification, as it required group formation. There was a challenge to meet (collect as much information as possible in less time). Its result involved a prize and a classification, as well as being a first phase (of a previous game-phase of Parkour modality recognition) that would be extended during the next four subsequent classes.

However, the pedagogical action revealed the opportunity promoted between gamification and ICT in terms of training for and with digital culture. This fact showed that many TITs, despite using smartphones, did not know how to apply QR codes or their potential for creative or pedagogical use. Thus, it was an action that encouraged pedagogical creation, knowledge of the characteristics and history of that application, and, above all, opened the possibility of authorship with that ICT for a more creative teaching of the curriculum component, Physical Education, and its association with gamified strategies.

3.3. Theoretical-practical relationship under discussion

In our last category, we group the records related to the evaluation discussions held at each thematic seminar. An intersubjective experience that was relevant in the understanding of gamification to the meanings produced (Lima & Andrade, 2018) at the time of pedagogical dialogs.

As Mendes (2016) suggests, the practical seminars were conceived in a pedagogical attitude centered on interlocution. This word means "a multiple sharing, a communication,



a conversation, a dialog, and presupposes the existence of subjects who communicate from specific situations in which they are found” (Mendes, 2016, p. 184). In this sense, many debates, permeated by the revision of the theoretical foundations of gamification as well as by the essential texts studied in the subject, allowed to reflect on points that were difficult for TITs or even theoretical-practical contradictions, as seen in some of the passages:

TIT 04: I wanted to speak [...] The part where they made a circuit...oh, you couldn't even see or feel that we were in a game. I don't know; it wasn't even related to the previous lesson.

TIT 05: But it was a circuit. **This part should not be gamified** [emphasis added], only at the time of the challenge. **It didn't even have points** [emphasis added].

TIT 08: But that is the meaning. Gamification is not just about doing an activity with points, with the competition. That is already done in the traditional classroom. What we want to tell your group is that you have to think about the process, you know? [...] How will you make the student learn, but with a goal, that has to be a goal, and [...] then you will take him to a goal, but through everything, what is a game... is the character, taking life, you know? (T2, 11/08/2019)

In the previous dialog, the understanding of TIT 05 on gamification was not yet clear in terms of procedure. For her, some activities could be gamified, others could not. Their understanding seemed to reduce gamification to the presence of an activity in the pedagogical scene. Through the counter arguments of other TIT and the teacher, this understanding could be discussed, opening up spaces for the elaboration of new associations in relation to the procedure involved in gamified actions.

In another debate, some TITs questioned the emphasis of the literature on predicting that gamification can promote or foster the commit-

ment and motivation of participants. During the evaluative debate of the third thematic seminar, TIT 14 questions the class about the motivation of other participants. The academic points out that, despite the fact that until that moment that was the class that was best characterized in terms of the assumptions of gamification, many participants had not committed.

TIT 14: They [the group] used gamification well. I think it was the group that used gamification the most. [...] But I think...[...] that students lacked a little motivation. I didn't feel they were so motivated. Because I think that is one of the elements that gamification is trying to enhance. I wanted to know from the group what they thought. (D2, 11/13/2019)

The debate revealed a critical questioning by TITs to investigate the conceptual propositions studied. This action appears to be essential in the formation of teachers, as already recommended by different authors aligned with the concept of reflective teacher training (Nóvoa, 1989; Zeichner, 1993; Pimenta & Ghedin, 2003). TITs argued that gamified actions may or may not promote motivation and commitment of students to desired actions, although it recognized that the presence of game design elements has a very attractive potential when it is well structured.

The following hypotheses were raised to understand why students were not motivated by gamified experience: (i) it was considered that this could be an occasional event, or even external issues outside gamification planning, such as after-meal class hours, the temporary heat of the day and, ultimately, not an inherent issue of gamification; (ii) some elements of gamification were also considered to contradict school culture, for example, freedom of action. In this context, it was argued that games are developed by players freely, voluntarily and deliberately and players choose the games they want to play, the time of day, the number of times they repeat, etc. However, the typical actions present in school and curricula do not permit or even lack the con-



ditions for freedom of action and voluntariness to be fully experienced.

Finally, we note that the evaluative-reflexive exercises gained more conceptual consistency throughout the practical seminars, passing from an almost total absence of interlocutions with the readings suggested in the previous period of the course or even in the TIT surveys on the subject studied, to a more significant presence of theoretical and practical analysis at the end of the experience. As an example, we present an evaluation made by a TIT in the last practical seminar, which presents these argumentative characteristics:

TIT 16: I read the texts [...] I reread it, [the text] by Mauro Berinbau, which is: "Gamification: A development proposal based on game design, with a focus on communication". [...] He speaks of the pyramid structure of the game, which is the setting of rules, the freedom of action and the condition of the experience for the player. And then the theme of Zombie was the construction of the experience.... [...] there was the establishment of rules. [...] [...] There was a small map, there was a route you could take... If you wanted to go to the RU [university restaurant] you could go. It is freedom. [Laughter]. About the [teams] division: he divided them into runners, support and screenwriter. [...] I remember the text; Barklei speaks of the behavior generation matrix, which will be divided into runners, murderers, socializers and explorers. I could understand that the runners were a bit conquerors and murderers. [...] [...] Then there's the support, which was filming, right? [...] Then there was the one who filmed, who had to pay attention to the other of his team [...]. And the screenwriter who had the map, right? I saw it as an explorer. Because the characteristic of the explorer is [TIT does the reading]: "desire with the interaction of the game and its possibilities, seeking the surprise of novelty, through the discovery of new places, creatures, objects". (T5, 04/12/2019)

We note that reflection was addressed to a more teleological and epistemic field at the end

of the process. In this sense, we could observe that experience forged new possibilities of significance and learning by taking communication and reflection as mediators of the actions. Therefore, if we consider that the game is always a dialogic act that is sometimes collective and collaborative, learning about the dynamics of the games and their transposition into other non-playful contexts also seems to be one.

4. Conclusions

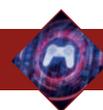
The results demonstrate the importance of gamification training in teacher training. The results revealed the presence of three relevant elements for teachers to use gamification: understanding the gamification process more broadly, beyond competition systems between individuals and teams; the association between gamification and ICT can promote training for and with digital culture; the presence of evaluative-reflexive exercises, since they enabled TITs to reevaluate the pedagogical process, making them understand the potential of the use of gamification in teaching.

Thus, the conclusions corroborate other studies already carried out in the area and indicate the potential of gamification in teacher training (Alves et al., 2014; Carvalho & Lima, 2019; Martins, & Giraffa, 2015).

We consider it relevant that the actions of teacher training for and with gamification relate, whenever possible, theoretical-methodological exercises of creation and practical experience of gamified situations, centered on teaching practice, since they helped to develop a greater conceptual consistency and the ability to justify the didactic actions and pedagogical planning related to gamification in a more cohesive and scientific way.

Note

- 1 Parkour is a contemporary sport of bodily practice, of French origin, whose objective is to travel a path, overcoming any obstacle quickly, safely and efficiently, only using the skills and abilities of the human body



2 The QR code is a two-dimensional bar code, or barometric code, that can be easily scanned with most camera-equipped mobile phones and that is able to retain and allow access to different information.

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Gamification and collaborative online learning: an analysis of strategies in a Mexican university

Gamificación y aprendizaje colaborativo en línea: un análisis de estrategias en una universidad mexicana

 **Dr. William Reyes-Cabrera** is a professor and researcher at Universidad Autónoma de Yucatán (México) (wreyes@correo.uady.mx) (<https://orcid.org/0000-0002-3443-6385>)

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Abstract

Despite distance education has proved its benefits in the teaching process, one of its main shortcomings is the lack of its own strategies, however, gamification is considered as an effective tool to work with on this modality. Based on the above, a pre-experimental, exploratory, quantitative research study was carried out in a Mexican university following the next objectives: identifying the level of incidence that gamification strategies have regarding collaborative learning in a distance course from the perspective of university students; as well as checking if there are significant differences between the different gamification strategies in collaborative learning of university students. A distance course was used, for this purpose where three gamification strategies were performed (PBL, Digital StoryTelling and Escape Room); students answered then the COLLES instrument at the end of each of these strategies to find contrast to the responses obtained. Thus, the means, standard deviations and ANOVA of one factor for repeated samples were compared. The results indicated that all three strategies had a positive impact on collaborative learning, however, there are significant differences in their scales. It is concluded that the characteristics of each strategy are key in achieving online collaborative learning. It is recommended to select and articulate gamification strategies when designing a distance course considering constant measurements to identify and maintain the levels of collaborative learning.

Keywords: Education, measurement, learning, collaboration, gamification, strategy.

Resumen

Aunque la educación a distancia ha demostrado sus beneficios en el proceso de enseñanza, una de sus principales carencias es la falta de estrategias propias; sin embargo, la gamificación se considera como una herramienta efectiva para trabajar en esta modalidad. Por ello, se realizó una investigación de enfoque cuantitativo, de alcance exploratorio del tipo preexperimental en una universidad mexicana con los siguientes objetivos: identificar el nivel de incidencia que tienen las estrategias de gamificación en el aprendizaje colaborativo en un curso a distancia desde la perspectiva del estudiantado universitario; y comprobar si existen diferencias significativas entre las diferentes estrategias de gamificación en el aprendizaje colaborativo del estudiantado universitario. Se utilizó un curso a distancia donde se emplearon tres estrategias de gamificación (Tríada PET, Digital StoryTelling y Escape Room); el alumnado contestó el instrumento COLLES al finalizar cada una de estas para contrastar las respuestas obtenidas, por lo que se compararon las medias, desviaciones estándar y la ANOVA de un factor para muestras repetidas. Los resultados indicaron que las tres estrategias incidieron en el aprendizaje colaborativo, aunque existieron diferencias significativas en sus escalas. Se concluye que las características de cada estrategia son determinantes para lograr el aprendizaje colaborativo en línea. Se recomienda seleccionar y articular las estrategias de gamificación en el diseño de un curso a distancia y realizar mediciones constantes para identificar y mantener los niveles de aprendizaje colaborativo.

Descriptores: Educación, medición, aprendizaje, colaboración, gamificación, estrategia.

1. Introduction

Distance learning (DL) has become more relevant in recent years, driven mainly by the evolution of technology, social, economic and recent changes as an alternative to continuing daily activities from home, as a result of the pandemic that affects humanity. In addition, it has demonstrated its advantages over face-to-face education, mainly because of the flexibility in working hours, in access to resources for carrying out tasks, as well as the technological support that is more affordable for both institutions and most of students (Pattanshetti et al., 2018). Other advantages are the degree of experience that teachers and students have in the management of educational platforms for synchronous and asynchronous activities, in addition to the already widespread social acceptance of this modality (Teo et al., 2020), which allows it to be present at all levels of education. However, gaps have been observed in the planning and implementation of teaching and learning strategies relevant to the DL (Al-Jedaiah, 2020), which has led to the adaptation of strategies from face-to-face education to virtuality or a “repackaging of traditional instructional strategies” (Wiggins, 2016, p. 27), as well as the growing concerns in the little socialization that students have by not interacting physically with other peers, now increased by current mobility restrictions, causing desertion, dropout of studies, and even emotional and psychological problems (Boverman & Bastiens, 2020).

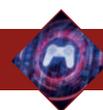
Facing these scenarios, it is essential to have strategies to motivate students to continue formal studies in DL, specially to improve the learning conditions, beyond being considered a technology-based learning (Teo et al., 2020), to achieve unique learning experiences with digital tools and own strategies for DL (Barna & Fodor, 2019). There are various strategies and methodologies aimed at achieving these new ways of learning in virtuality, being gamification an effective tool in distance and online learning (Rebelo & Isaias,

2020) since it can motivate and engage students to continue the training process (Poondej & Lerdpornkulrat, 2019), enhancing the experiences of new generations at all educational levels by using this type of strategies and current technological resources (Duggal et al., 2021).

1.1. Gamification and its strategies

Gamification is the “use of game elements in non-playful contexts” (Deterding et al., 2011, p. 2425); a method (Rodriguez & Arias, 2020) addressed to motivate (Laine & Lindberg, 2020), which can induce behavioral changes and strengthen participant engagement (Hamari et al., 2016); however, the superficial application of gamification, only considering the basic aspects of the game and not the pedagogical and learning character, allows gamification to generate frustration and boredom (Khoshkangini et al., 2021), hence, it is recommended to use various strategies to maintain levels of care and motivation. In this sense, Kapp et al. (2014) point out that the structure of gamification events or “interactive learning events” (p. 2) should be focused on the content of the learning units without losing the experiences generated by games. For its part, Kingsley and Grabner-Hagen (2018) state that the entire course, both in vocabulary, mechanics and component design, must be game-oriented; while Werbach and Hunter (2015) point out that for an activity to be considered as gamification, three or more mechanics must be used.

Although gamification does not have strategies of its own, there are several that are related to it (Silva et al., 2019). For example: one of the most widely used strategies is the PBL triad [Points, Badges and Leaderboards] or PET: Points, Emblems, and Leaderboards. PBL is a basic strategy in gamification that consists of using three mechanics: a point system for participants in performing an activity; emblems or badges that are awards for achieving a goal in any of the activities in an outstanding way; and the classification tables, considered a “ranking”



generated according to the scores and emblems obtained by the participants (Werbach & Hunter, 2015; Fernandes et al., 2018). Another of the most widely used strategies is Storytelling or Digital Storytelling if using digital resources (Buendgens, 2021), where the narration of a story that involves the participants is developed, taking the role of the characters in that story. This narrative is divided into chapters or episodes that go through as participants make decisions for the progression and their completion (Lawrence & Paige, 2016; Gambarto & Dabagian, 2016). Finally, the strategy of Escape Room (Fotaris et al., 2016; Bartlet & Anderson, 2019) known in Spanish as the Escape Room or Breakout in English, which consists of having a group of people in a closed room, in which, in order to get out, they must solve a series of clues or puzzles associated with the subject. In distance courses, rooms and puzzles are digitally generated and participants must resolve them collaboratively through their internet-connected devices (Jiménez et al., 2020).

1.2. Collaborative Distance Learning

Collaborative learning is an educational approach to teaching and learning for students to work together to solve a problem, complete a task, or create a product (Laal & Laal, 2012). This form of learning has been used in the classroom with good results (Laal & Ghodsi, 2012) and it has allowed DL to develop successfully, especially with the support of information and communication technologies (Al-Samarraie & Saeed, 2018); however, the main challenge lies with teachers and experts when designing learning experiences and academic performance in an online environment (Kumi-Yeboah, 2018). To study collaborative learning, different research has been carried out (Syed-Mohamad et al., 2006; Fraternali & Herrera, 2019; Azhari et al., 2020), which have enabled a number of key indicators to identify collaborative online learning, such as reflexive thinking, interaction, support

from teachers, peers, interpretation, relevance, and others; from which online collaborative learning can be measured using the strategies and materials used in the learning units in a DL course (Taylor & Maor, 2000; Yen et al., 2018).

1.3 Research objectives

Aunque se ha demostrado que la gamificación promueve la motivación y el compromiso por aprender, se necesita identificar cómo incide en el aprendizaje colaborativo. Por lo tanto, es necesario conocer el efecto de estas estrategias que son cada vez más utilizadas en los contextos educativos a distancia. A partir de lo anterior, se realizó una investigación con los siguientes objetivos principales:

Although gamification has been shown to promote motivation and commitment to learning, it is necessary to identify how it affects collaborative learning. It is therefore necessary to know the effect of these strategies that are increasingly used in distance learning contexts. Research was carried out with the following main objectives:

O1: Identify the incidence level of gamification strategies in collaborative learning in a distance course from the view of the university student.

O2: Check whether there are significant differences between the different gamification strategies in collaborative learning of university students in a distance course.

2. Methodology

2.1. Research design

The research is quantitative, exploratory and pre-experimental (Hancock, 2004) because group of students were selected to take an official distance course in which there was an intervention using three gamification strategies and at the end of each one, they answered a



standardized instrument to identify the level of collaborative online learning.

2.2. Structure of the Distance Course

The course selected for the research was “Scientific Communication”, taught in the 2020-2021 school year at the Autonomous University of Yucatan (UADY), in a degree in the area of social sciences with a duration of 60 hours, with three learning units, all with the same characteristics in terms of the number of hours allocated, the level of their objectives (Pikhart & Klimova, 2019), the outputs to be presented, the number of topics, the teaching resources, the activities and the number of consultancies. This course

has been taught from 2016 on a distance basis and has used various gamification strategies such as challenges, badges, points, narratives, competencies, escape room, among others. Given the experience gained in using these strategies, it was decided to use the three mentioned above, so in the course design it was considered that in each learning unit the students will carry out the activities using a different gamification strategy. The strategy was also chosen according to its complexity, starting with the PBL triad in unit I, then the Digital Storytelling in unit II and finally the Escape Room in unit III. Table 1 presents the description of each strategy and the objectives used in each unit:

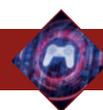
Table 1. List of objectives and strategies used in the distance course

Objective of the Unit	General strategy of the Unit	Overview of the strategy used
I. Identify the relevance of information technologies to disseminate scientific and technological knowledge.	PBL	Trained in teams, they will present a variety of technological resources that allow the dissemination of scientific knowledge. If meeting the requirements, they will receive points. If it is an outstanding job, they will be awarded a badge. The list of points and badges is presented in a team classification table.
II. Identify digital and print media for the publication of research results, as a way of communicating science.	Digital StoryTelling	Teams are presented a case for disseminating research in electronic media. The case will go through chapters, the decision-making of the team will allow the next chapters to continue until their completion.
III. Develop materials to support orally and assisted with computer.	Escape Room	The work teams carry out a series of materials (electronic presentation, infographic and video tutorial) using the resources that the instructor tells them. Each material must be made in a maximum of one day to continue with the following material.

Source: Own elaboration.

It should be noted that the program of the subject was not modified to be adapted to the strategies; modifications were made to the material delivered to students, for example, in the language used and in the graphic design of digital resources, which resembled a video game rather than a schoolwork (Kapp et al., 2014; Kingsley & Grabner-Hagen, 2018; Sheldon, 2012); in addition, the activities and resources of each unit should be directed toward meeting the objective of the unit and the development of the corre-

sponding strategy. The technological tools used for the implementation of the distance course were Moodle platform for asynchronous activities such as discussion forums, tasks, links to videos, and reading materials. Due to the technical characteristics of this platform, the obtaining of badges, unlocking of activities and resources was in an automated way, which helped to enrich the experience with gamification strategies (Barna & Fodor, 2019). On the other hand, for synchronous activities such as consulting and mentoring



sessions, the Microsoft Teams platform was used. Overall, due to the characteristics of both platforms and the strategies employed, it enabled a full course based on gamification for DL.

2.3. Participants

The participants were 90 students of the same degree and semester who studied the subject, who were invited to participate voluntarily in the research, explaining them the objectives, scope and that their participation would not modify their experiences with gamification strategies or their qualifications. Finally, 85 participated, out of which 45 were women (53%) and 40 men (47%). It was verified that they all had access to technological resources, a computer and internet connection; most (n=66, 78%) had these resources at home, while 19 (22%) connected in other places such as a family member's home or from work.

2.4. Tool

The constructivist online learning environment survey or COLLES (Taylor & Maor, 2000) was used to measure collaborative learning. This is an instrument for assessing the quality of a distance learning environment from the perspective of Vygotsky's social constructivism (Dougiamas & Taylor, 2002). The instrument consists of 24 reagents divided into six dimensions or scales: 1. Relevance, Reagents 1 to 4; 2. Reflexive thinking, from 5 to 8; 3. Interactivity, 9 to 12; 4. Professor support, 13-16; 5. Peer support, 17 to 20; and 5. Interpretation, 21 to 24 (Yeo et al., 2006). The response to the reagents was made using a five-alternative likert scale, where 1 is "almost never" and 5 is "almost always".

In relation to the reliability and validity of the instrument, these were obtained by analyzing similar studies where an coefficient of 0.80 was checked through the results of internal consistency (Yeo et al., 2006; Rivero, 2018; Azhari et al., 2020). On the other hand, Baker (2005) considers that scales are useful for both teachers and researchers in identifying authentic collaborative learning based on DL; and recently, Gutiérrez and Duche (2021) say that this instrument allows the integration of a model for collaborative online learning during COVID-19.

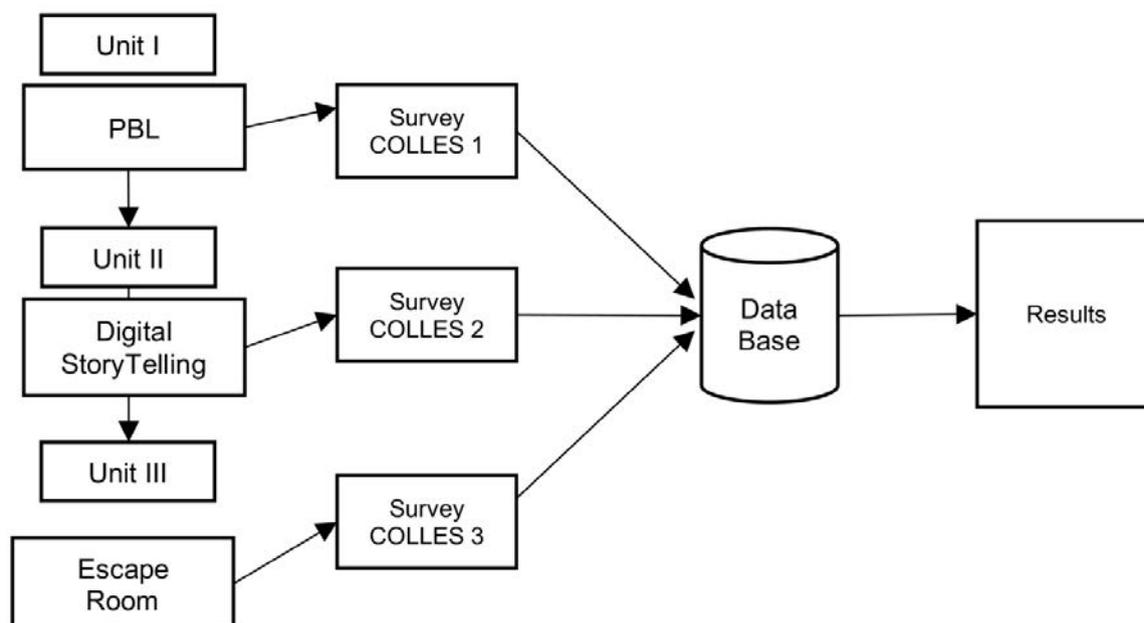
2.5. Data Collection and Processing

At the end of each learning unit, all students responded to the COLLES survey available on the Moodle platform. The responses were downloaded to .csv format files that were used to integrate the database. The following figure graphically shows the process used to obtain the information.

Due to the nature of the research and its objectives, the analysis and comparison of means and standard deviations were used, as well as ANOVA for repeated samples. To consider whether there was an incidence in the level of collaborative learning, it was considered that the average score should be higher than three (>3.0); otherwise, (<3.0) the strategy was considered to have no incidence. This criterion was also applied for each scale that makes up the COLLES instrument (Taylor & Maor, 2000). The significance value defined in the tests was considered to be 0.05 and the size of the effect used was the partial square eta determined at >.06 as a medium effect and >.08 as a large effect (Kraft, 2020). The program used for statistical testing and data processing was SPSS version 24.



Figure 1. Schema of data collection and processing



Source: Own elaboration.

2.6. Ethical aspects

As discussed above, all students were informed and agreed to have their answers published. The name of the degree and faculty was intentionally omitted in order to ensure the anonymity of the participants. This information is known and approved by the authorities of the faculty in which the investigation was conducted.

3. Results

Once the collected information was processed, the internal validity tests consisting of Cronbach's Alpha and McDonald's Omega were

performed; in the first one $\alpha=0.947$ and the second $\Omega=0.949$ were obtained. The following results are then presented when performing the statistical tests indicated in the methodology:

3.1. Levels of Collaborative Learning

When scoring each strategy, it was found that the PBL triad averaged ($M= 4.17$, $D.S.=0.59$), Digital Storytelling ($M= 4.27$, $D.S.=0.56$), and Escape Room ($M= 3.97$, $D.S.=0.61$).

When performing data processing, the averages for each scale that make up Collaborative Learning were obtained, the scores of which are represented in Figure 2 as follows:

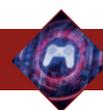
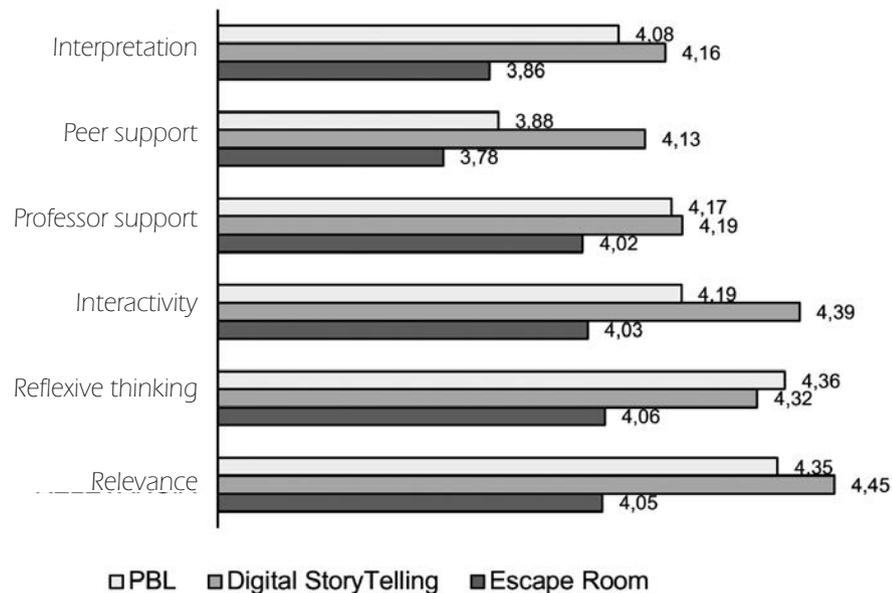


Figure 2. Comparison of the scales that make up Collaborative Learning between the three main gamification strategies used in the distance learning course



Source: Own elaboration

The Digital Storytelling strategy on most scales obtained the highest scores, especially in interactivity and relevance, $M=4.39$ and $M=4.45$ respectively; on the other hand, the Escape Room strategy had the lowest scores on all the scales analyzed. In addition, it was found that, at both collaborative learning levels and their scales, all strategies scored above the criteria established in the methodology.

3.2. Differences in collaborative learning levels

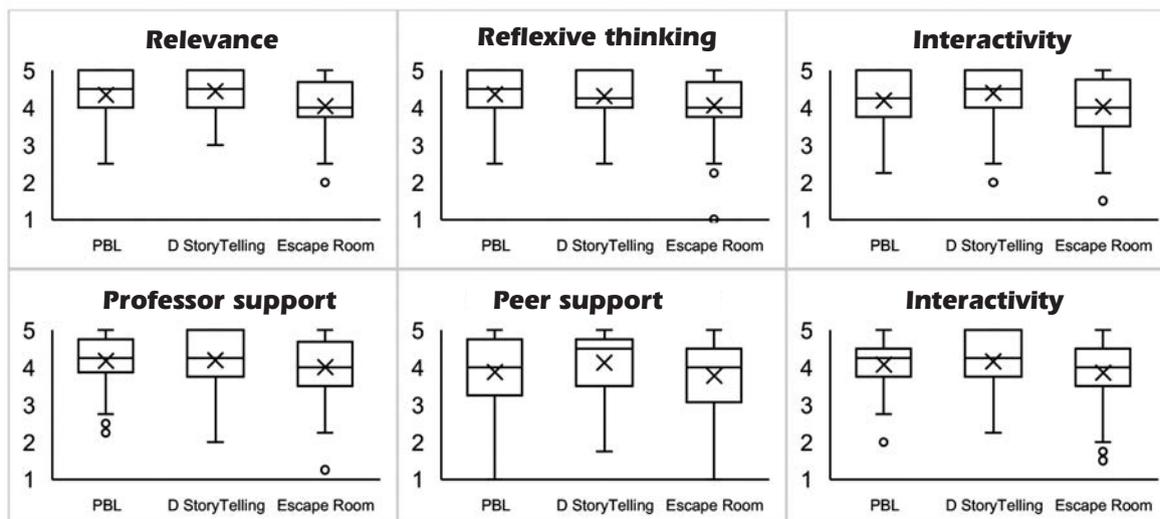
When checking whether there were significant differences in the collaborative learning level

between the three gamification strategies used in the distance course, the values obtained between the Collaborative Learning level with the strategy type had a value of $F=4.008$, $p=.021$ and $\eta^2p=.065$, which indicates that there are differences between the strategies employed; but when performing the Bonferroni post-hoc test, the differences were between the Escape Room and Digital Storytelling ($p=.031$, $\eta^2p=.077$).

Regarding the scales, Figure 3 represents the differences between the strategies used.



Figure 3. Differences between the scores obtained on the scales that make up Collaborative Learning



Source: Own elaboration

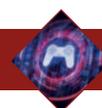
Significant differences were found in three scales: Relevance ($F=5.680$, $p=0.04$, $\eta^2p=.082$), reflexive thinking ($F=3.610$, $p=0.029$, $\eta^2p=.071$) and interactivity ($F=3.490$, $p=0.033$, $\eta^2p=.060$). When performing Tukey post-hoc tests, the Relevance scale presented significant differences between Escape Room and Digital Storytelling strategies ($dif=-.39$, $p=.004$) and Escape Room with PBL ($dif=-.29$, $p=.040$); the Reflexive Thought presented differences in Escape Room with PBL ($dif=-.30$, $p=.035$) and the Interactivity scale in Escape Room with Digital Storytelling ($dif=-.36$, $p=.025$).

4. Discussion and conclusions

Initially the distance course was designed for students to perform all group activities; then, the use of gamification strategies also took into account team work and support among members in achieving the competencies stated in the curriculum. The above resulted in high levels of Collaborative Learning; however, differences were found in the analysis of the scales as in the case of the scales of relevance and interactivity

whose scores were higher in Digital Storytelling, a strategy that is widely used in gamification by teachers, especially in language learning and in the social sciences (Silva et al., 2019) because it “allows a fictional world to deal more effectively with the challenges of the real world” (Gambocar & Dabagian, 2016, p. 242) and that favored the professional theory-practice in online learning as well as the establishment of a rich educational dialog (Taylor & Maor, 2000).

On the other hand, the PBL triad presented the greatest scores and significant differences in the scale of reflexive thinking, which is the critical analysis that students have about the contents studied during the unit (Dougiamas & Taylor, 2002). It also encouraged the competitive spirit of students to obtain a better position in the ranking of the teams, as happened in the study of Uz and Gul (2020) when using this strategy. In the case of the Escape Room, it also influenced Distance Collaborative Learning; however, by conducting statistical tests and comparing their scores with the other strategies, it obtained the best results, probably because this strategy is oriented to develop in a physical environment, using a classroom and real objects (Bartlet & Anderson,



2019), although there are virtual designs for the escape room whose results have been satisfactory (Jiménez et al., 2020; Hunt et al., 2020). Because of the latter, it is concluded that the gamification strategies used in the distance course had an impact on Online Collaborative Learning, with Digital Storytelling's strategy being the one with the highest score, possibly because of the characteristics of each strategy that would be determining factors in the scales of Online Collaborative Learning, mainly in relevance, interactivity and reflexive thinking.

There are two recommendations from these results: the first, when using gamification strategies, it is necessary to combine the type of learning sought and the mechanics or strategies to be used for the course; although there is a wide variety of mechanics and strategies that can be used and that researchers have documented in their studies, it is advisable to start with those that are considered basic and have had the most analysis, specifically regarding points, badges, leaderboards and narratives. In the case of using strategies that would be considered more complex such as the Escape Room, teachers should be familiar with their characteristics and anticipate their possible effects on the students, as more preparation is required in the design of the activities, mainly by working online. The second recommendation is to make measurements with validated instruments to have reliable indicators and monitor the group before, during and at the end of the distance course. Using COLLES instrument is reliable and valid to identify the collaborative learning of students, it allows teachers to make timely decisions to improve the design of distance courses, and it also improves the experience of students with activities that foster motivation and interest toward the subjects. In this way, it is possible to achieve better indicators on school dropout and society's acceptance of distance education, regardless of whether current and future generations need to study in this way, since the most

important thing is to combine technology and good educational practices.

4.1. Limitations and Constraints

There was no sample procedure because students voluntarily enrolled in the course in accordance with procedures set by the institution; gender or the school group they belonged to were not considered as study variables. On the other hand, the instrument was applied at the end of each unit in order to identify the level of collaborative learning achieved by each strategy, unlike other studies where it was provided at the beginning and end of each unit to compare both scores. This procedure is known as a "preferred and real survey" (Rivero, 2018, p. 179; Azhari et al., 2020, p. 274; Syed-Mohamad et al., 2006, p. 187; Sthapornnanon et al., 2009, p. 5).

Supports

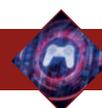
This work was part of the "Distance Gamification Strategies in Higher Education" project that was funded by the Higher Education Professional Development Program (PRODEP) of the Ministry of Public Education (SEP) in Mexico. In the framework of the call "Support for the incorporation of new full-time teachers (PTC)".

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Do we play or gamify? Evaluation of gamification training experience to improve the digital competence of university teaching staff

¿Jugamos o gamificamos? Evaluación de una experiencia formativa sobre gamificación para la mejora de las competencias digitales del profesorado universitario

- ORCID** **Lorena Martín-Párraga** predoctoral, PhD student, Universidad de Sevilla (Spain) (lorena@grupotecnologiaeducativa.es) (<https://orcid.org/0000-0002-2406-0708>)
- ORCID** **Antonio Palacios-Rodríguez** PhD assistant, Universidad de Sevilla (Spain) (aprodriguez@us.es) (<https://orcid.org/0000-0002-0689-6317>)
- ORCID** **Dr. Óscar Manuel Gallego-Pérez** is a professor and researcher at Universidad de Sevilla (Spain) (ogallego@us.es) (<https://orcid.org/0000-0001-8450-8634>)

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Abstract

Over the last few decades, studies have been carried out in the field of education that endorse the benefits that gamification offers both for teachers and students. The university is working along these lines, with the aim of developing optimal skills that benefit students, both personally and professionally. Consequently, this training designed and selected for teachers is essential to achieve a successful gamified experience. The main purpose of this research is to present a training experience carried out in a university in Latin America and to verify the perception of this methodological strategy by this educational institution. In other words, the aim is to demonstrate whether gamification is perceived as useful by university teaching staff. To this end, two designs were used: descriptive and validation by means of structural equations (PLS), in order to evaluate the degree of acceptance of gamification as an active methodology based on the Technology Acceptance Model (TAM). The results show that the proposal is suitable for university teaching. All the participants, 114, perceived this strategy as adequate, detailing the dimensions related to the ease of use in the classroom, its integration, the transformation of interest in learning, and the ability to show a positive attitude in its use. At the same time, the level of acceptance regarding the validation of the TAM is high. Finally, the assessment of the replicability of the model in future and similar research, or through so-called emerging technologies, is detailed.

Keywords: Gamification, Higher education, digital competence, teacher training, active methodologies, validation.

Resumen

En las últimas décadas se han realizado estudios en el ámbito de lo educativo que avalan los beneficios que la gamificación ofrece tanto para docentes como al alumnado. En esta línea se trabaja desde la universidad, con la finalidad de conseguir desarrollar habilidades óptimas que beneficien al alumnado, tanto personal como profesionalmente. En consecuencia, esta formación diseñada y seleccionada para docentes es esencial para conseguir una experiencia gamificada exitosa. El objetivo principal de esta investigación es exponer una experiencia formativa llevada a cabo en una universidad de América Latina y comprobar la percepción de esta estrategia metodológica por parte de la institución educativa. Es decir, la finalidad consistiría en demostrar si la gamificación es percibida como útil por parte del profesorado universitario. Para ello, se han empleado dos diseños: descriptivo y la validación mediante ecuaciones estructurales (PLS), de forma que se pudiese evaluar el grado de aceptación que tiene la gamificación como metodología activa en base con el modelo de Aceptación de la Tecnología (TAM). Los resultados expuestos demuestran que la propuesta es adecuada para la docencia universitaria. Todos los participantes, 114, percibieron esta estrategia como adecuada,

detallando las dimensiones relacionadas con la facilidad de uso en el aula, su integración, la transformación del interés en el aprendizaje, y la capacidad de mostrar una actitud positiva en su uso. Simultáneamente, el nivel de aceptación respecto a la validación del TAM es alto. Por último, detallar la valoración a la hora de replicar el modelo en investigaciones futuras y similares, o a través de las llamadas tecnologías emergentes.

Descriptores: Gamificación, Educación Superior, competencia digital, formación del profesorado, metodologías activas, validación.

1. Introduction

The 21st century society is immersed in constant technological and methodological challenges, transforming its educational practice. The adequacy of the educational environments to these trends, the needs demanded by the system and the changes that have occurred, influence the way we communicate, learn and interact in the so-called information and communication society. It is a hyper-technological society, immersed in continuous and multiple changes, many of them produced by the use and implementation of digital technologies (Tornero & Varis, 2010). There are new media that literate practices, adding importance to interpreting the functioning of the work and recreational contexts of the knowledge community of the 21st century (Mills, 2010)

A new technological era, which is the result of accelerated changes, where information opens up paths promoted by the advances characterized by the use of so-called Information and Communication Technologies (ICT). The possibility of immediate access to each of the sectors that make up this cycle announces the essential elements that generate a great added value to the economic and social development of the knowledge society.

The technology of information is the purpose that impels and generates new alterations in the organization of knowledge, practices and forms of organization, as well as in the shaping

of human cognition, without ignoring the topic that concerns us: education.

It highlights the need for digital teacher transformation and the acquisition of skills, defined, according to the European Union, as “a combination of knowledge, skills and attitudes appropriate to the context” (Consejo de la Unión Europea, 2018, p.7). Therefore, it is essential to acquire skills that respond to the current challenges.

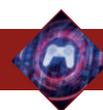
Despite this progression, the fact of incorporating technology does not change learning environments. According to Pelgrum and Voogt (2009), to achieve this purpose, there must be leadership in the centers that can motivate teachers to use new teaching methods in relation to ICT, in order to acquire higher levels of competence in the use of ICT and to develop a collaborative culture that encourages the inclusion of ICT in the teaching and learning process (T-L).

This is where the term “E-Learning” established by the European Commission is important. Virtual education would become one of the most powerful tools whose quality must be measured when designing training plans for this modality.

As detailed in the Istanbul Declaration (2002) and the Alexandria Declaration on Information Literacy (2005), training in digital skills is essential for a citizen to develop adequately in the Knowledge Society (Gutiérrez-Priego & García-Peralta, 2016).

Therefore, online education is a crucial tool for being involved in technological contexts, achieving the increase of key competencies that allow the development and autonomy of good educational practices through virtual environments. It is a type of virtual pedagogy that will promote collaborative work, improve individualized tutoring, and that will be able to include diversity in learning, improving the student's proficiency level and commitment.

To do this, the teacher must be able to develop dynamizing and cooperative methodologies focused on “learning by doing”, as a method guided to the improvement of the performance, applicability and motivation of student learning.



Hence, the need to achieve a literacy model that offers a digital culture, which promotes: “Digital literacy, e-learning, e-inclusion, e-health and digital solutions in these fields” (provision 8301 of relations with the courts and equality, 2019). In turn, the importance of providing educational communities with different digital platforms and technological and didactic resources to ensure their correct application in the T-L process (provision 8301 of relations with the courts and equality, 2019).

The importance of using ICT to facilitate our daily work, to improve our professional performance and as lifelong learning is a relevant and substantial aspect of any training program (Cabero-Almenara & Palacios-Rodríguez, 2020). The significant increase in this progression will mean that jobs will require digital skills in the near future (Williamson et al., 2019).

When we talk about including a competency model in a curriculum, we mean that learning activities should not be limited to a single subject, but that the content developed seeks to achieve the same competence that will enable them to cope with any situation. We must be able to achieve a change in methodologies, moving from a type of reproductive methodology to a productive one. Only in this way will students be able to apply knowledge acquired in a problem-solving area in different scenarios. The consolidation of competencies through productive strategies simultaneously enhances different aspects of the teaching-learning process (T-L).

In this sense, with the main purpose of offering solutions to these positions, new ways of interpreting the educational environments are proposed, seeking a transformation that will achieve a better didactic adaptation in this sector. These active methodologies make students to take on a dynamic role in their own learning by transforming rigid and memoristic concepts.

In most of our universities, traditional teacher-centered and not student-centered learning methodologies continue to be used (Lai et al., 2018; Pelger & Nilsson, 2018). Consequently,

gamification emerged, aimed at the search for a better adaptation to current contexts, addressing the diversity and equality of conditions in the classrooms and developing different ways of motivating and energizing the T-L process. This strategy consists of introducing activities in the classroom through the dynamics of games, allowing the construction of dynamic learning, where the increase of the student’s participation is enhanced and, therefore, the student acquires the need to “learn”. In other words, gamification is a type of strategy that promotes more meaningful learning focused on the interests of students (Kapp, 2012; Herberth-Alexander, 2016; Molina-Álvarez et al. 2017; Corchuelo-Rodríguez, 2018). This rethinking of education brings with it new methodologies and, therefore, the need for digital transformation and the acquisition of key competencies that achieve quality education mediated in today’s digital transformation environments.

The fields of application offered by gamification are diverse, the most researched is education (Dominguez-Díaz, 2018), where its implementation arises in e-learning environments, given its digital nature (Muntean, 2011). This means that, in recent times, these gamifying practices are taking on a significant role (Peñalva et al., 2018), especially because of the diversity of possibilities they offer, as shown by the various meta-analyses on the subject (Martínez-García et al., 2020). A study conducted by Çakıro lu et al. (2017), where real evidence was presented, revealed the positive effect that gamification has in education and how education manages to influence, indirectly, academic performance, personal commitment and social relations, generating positive effects and motivational impacts that benefit the T-L process

This type of learning is optimal due to its enjoyment and the good acquisition of contents (Molina-Álvarez et al., 2017). It is understood that in games, the challenges pose the need that the player has in order to exceed his/her expectations, causing this a psychological burden with



the aim of influencing human behavior (De Soto García, 2018).

Many of the studies carried out in this field of study conclude that gamification can offer different advantages for both teachers and students. For example, it allows the teacher to better understand the learning styles and difficulties of the students and to offer more immediate feedback, as well as to take advantage of class time for understanding the contents (Ortiz-Colón et al., 2018). On the other hand, students are more involved than in traditional classes, provoking positive emotions and attitudes towards learning (Gallego-Durán et al., 2014).

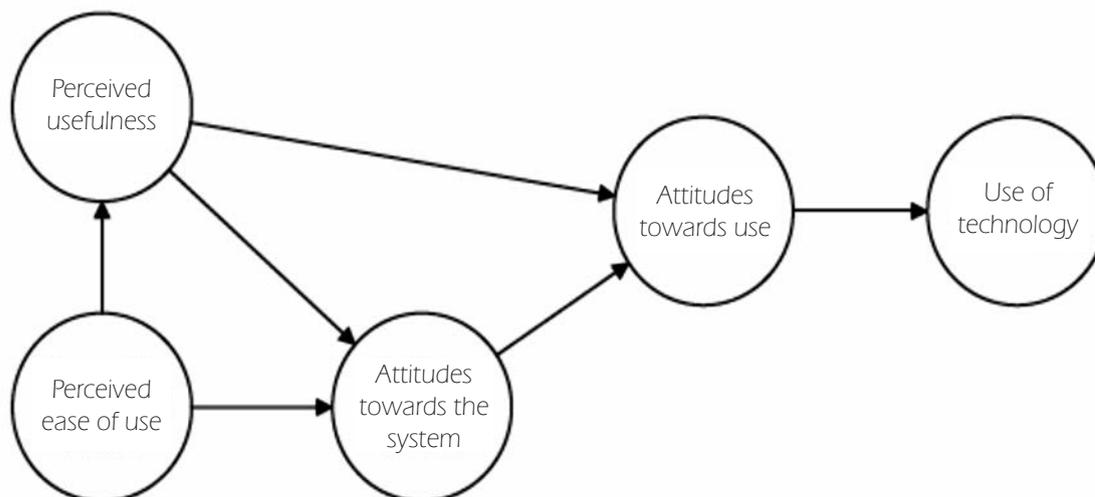
Gamification has proven to be effective in terms of acquiring knowledge and skills for the professional future of students (Villalustre-Martínez & Del Moral, 2015). In turn, other authors claim that it could be used as a motivational mechanism to encourage positive behaviors among students for their training (Kapp, 2012; Smith-Robbins, 2011). Focused on the relationship between learning based on gamified activities, Donoso-Anés and López-Gavira (2010) observe that peer-to-peer instructional opportunities are increased when classroom activities promote active learning. In short, gam-

ification is an active methodology that arises from the teaching interest in improving and motivating the student's commitment to self-learning (Rodríguez-Jiménez et al., 2019).

Although many studies have investigated the specific activities and practices used in gamification (Cortizo-Pérez et al., 2011), little attention has been paid to the final outcome of these activities, nor to the satisfaction of the students or teachers who conduct them.

To analyze the acceptance degree of the gamification methodology in this study, one of the models that has the greatest significance acquired is used to explain the adoption degree of a person towards technology, both general and concrete. This model was originally called the Davis Technology Acceptance Model (TAM) (1989), which states that beliefs, attitudes or willingness on technologies will have an impact on the use of technology. For this purpose, it is determined by two variables: perceived utility and perceived ease of use. The TAM model empirically proposes and demonstrates that Perceived Usefulness (PU) and Perceived ease of use (PFU) are the most critical factors in the process of technology adoption and systems use (Chen & Tan, 2004).

Figure 1. Davis Acceptance Model (1989)



Different transformations have been introduced in different studies (López-Bonilla & López-Bonilla, 2017; Cabero-Almenara et al., 2016; Cabero-Almenara & Llorente, 2020; Cabero-Almenara et al., 2021b) through the incorporation of new dimensions such as, for example, predictive dimensions (gender, degree of compulsory adoption of technology, experience, age, type of users...).

From the model itself it is emphasized that it must be built in each and every situation of acceptance of the technologies that are to be investigated. For this reason, it adapts exceptionally to the study presented, contextualizing and locating the mediating variables considered from the researcher's point of view. In this sense, the model has evolved into other versions, such as the TAM 2 (Venkatesh & Davis, 2000) or the integration model of technology acceptance and user satisfaction (Venkatesh & Bala, 2008).

2. Methodology

Because of the latter, this research presents the design of a training proposal for Latin American teachers in Higher Education. In this sense, the training process is developed and the degree of acceptance by teachers on this methodology is evaluated. Therefore, the proposed objective is to study the level of acceptance of the gamifying methodology of the university faculty involved in the formative action: validation of the gamifying methodology acceptance model (TAM) and analysis of the level of acceptance of the gamifying methodology.

This study uses two types of designs: scale validation and descriptive analysis. The first attempts to validate the scale of acceptance of the gamification methodology by adapting Davis TAM model (1989). Subsequently, the most significant data related to the acceptance of the gamification methodology were provided.

The 114 participants correspond to: male professors (54) and female professors (60) of the Private Technical University of Loja (UTPL),

Ecuador. This faculty is part of the staff of the university responsible for developing classes in the face-to-face and online modality of the different degrees and postgraduate courses that it offers.

UTPL is an autonomous institution with social and public purpose; it offers a teaching-learning process, conducts research with scientific and administrative freedom, and participates in development plans in the country.

The experience with UTPL faculty is presented. The aims and objectives that are pursued with the formative action are as follows:

- Learn basic concepts related to gambling, video games, Game-Based Learning (GBL) and gamification.
- Gamification in Higher Education.
- Know the importance of applying the term in training scenarios.
- Know what different elements of the game are relevant to their application in the areas that are demanded.
- See various examples of gamifying educational applications.
- Acquisition of strategies that make it possible to apply this strategy in teaching.
- Develop skills for the production of gamified resources through free or licensed software.
- Produce gamifying resources for a subject.

The course content will be developed as follows:

- Gamification.
- Theories that underpin gamification: Flow Theory and Fogg Model.
- Techniques and dynamics of gamification.
- Gamification in the T-L process
- Gamification in Higher Education.
- Game-Based Learning (GBL)
- The Game in College Education
- Gamification Tools



1. Edmodo
2. Clase Dojo
3. Quizizz
4. Mentimeter
5. Socrative
6. Kahoot
7. Studio

2.1. Integration of gamifying tools in Canvas

The three trainers in charge belong to Universidad de Sevilla and carry out this activity online. Participants have all the necessary content and resources in the classroom, which are completed with three videoconferencing sessions that discuss theoretical and practical aspects of the topic.

The course materials are different, mainly text fragments, outlines, graphs, and video clips. A series of links are presented that are directed to different documents and are indicated in the text; these are addressed to know more, and are not mandatory for the follow-up of the formative action.

As for the tutors, they have a daily presence in the course, encouraging participation and the solution of doubts collaboratively or to answer them directly. The solution of doubts takes place through a forum of doubts that is opened in the virtual platform for that purpose.

The final assessment of the course will be based on three axes:

- Performing the activities established in the distance learning.
- Participating in video conference sessions.
- Completing the final activity (production of gamified material for one of the subjects).

The TAM model is applied to measure the motivation degree as well as the satisfaction level

experienced by university faculty in participating in educational experiences supported in gamification and to be able to investigate the technical, curricular and organizational difficulties arisen (Davies Technology Acceptance Model, 1989). Its application is conducted online using the following address: <https://cutt.ly/8WHa4FS>

Prior to the analysis of the data, it is observed that these are not normally distributed through the study of asymmetry and kurtosis. The Kolmogorov-Smirnov goodness-of-fit test confirms it, with significance (p-value) equal to .000 for all items (non-normal distribution).

In order to achieve the main objective, the model of acceptance of the gamifying methodology (TAM-GAM) is validated by an analysis of reliability (Cronbach's Alpha and Composite Reliability), construct validity (AVE) and structural equation modeling (PLS). Descriptive and central trend analyzes are then carried out.

The data obtained are analyzed with the statistical package SPSS 27 (descriptive analysis and contrast), and SmartPLS 3 software (structural equation modeling).

3. Results

The level of acceptance of the gamifying methodology is studied after having presented the training proposal. In this case, an adaptation of the technology acceptance model (TAM) suggested by Davis (1988) is created for the gamification methodology. For this reason, the adaptation is validated before describing the data.

First, the reliability and validity values of the construct are yielded. In the case of validity, the overall result after applying the Cronbach Alpha is 0.912. According To O'Dwyer and Bernauer (2013), this figure implies a high level of reliability. The reliability, composite reliability and construct validity indices are calculated by dimensions. The results are shown in Table 1.



Table 1. Construct reliability and validity values by dimensions

	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
UP	0.914	0.956	0.824
FUP	0.802	0.872	0.821
PD	0.926	0.942	0.865
ACU	0.821	0.926	0.815
IU	0.895	0.985	0.846

As can be verified, all the relative reliability results (Alpha and Composite Reliability) are higher than 0.7, suitable minimum value according to Levy (2006) to indicate acceptable levels. Therefore, it can be stated that the proposed model of acceptance of the gamifying methodology has good internal consistency in its indicator block. For convergent validity, all the average variance extracted (AVE) indices are greater than 0.5. This value is taken as a reference by Bagozzi and Yi (1988) to indicate that more than 50 % of construction variances are due to model indicators. Thus, it can be

said that the total amount of variance of the indicators is taken into account by the latent construct.

This is followed by an analysis of the discriminating validity of the model, which allows to know whether each dimension is different from the others. Two techniques are used: Fornell-Larcker criterion and cross-loading analysis.

Fornell-Larcker criterion allows to check whether the one-dimension average variance extracted is higher than the variance of the other dimensions. Table 2 shows the results.

Table 2. Discriminant validity of the model using Fornell-Larcker criterion

	ACU	FU	IU	PD	UP
ACU	0.912				
FU	0.321	0.852			
IU	0.782	0.280	0.941		
PD	0.781	0.291	0.663	0.960	
UP	0.715	0.405	0.700	0.600	0.900

To interpret this table, it should be noted that the elements on the diagonal are the square root of the average extracted variance, and the others are the correlations between dimensions. As can be seen, all values on the left and below

the diagonal values are lower. The first criterion of discriminatory validity is therefore confirmed.

Next, the analysis of the cross loads of the model is performed. The results can be seen in Table 3.

Table 3. Load model crosses

	UP	FUP	PD	ACU	IU
UP1	0.902				
UP2	0.802				
UP3	0.905				
UP4	0.901				



	UP	FUP	PD	ACU	IU
FUP1		0.812			
FUP2		0.800			
FUP3		0.910			
PD1			0.963		
PD2			0.921		
PD3			0.854		
ACU1				0.903	
ACU2				0.910	
IU1					0.910
IU2					0.952

The results above 0.7 indicate high correlation levels (O’Dwyer and Bernauer, 2013). Therefore, it ensures that items measure the construct to which they are incorporated. The model formulated by obtaining the standardized regression coefficients (path coefficients), the values of the t student and the R2 (R-square) of the structural diagram are presented. In terms of results, the model explains 73% of the variance in the “Attitude toward Use” dimension, 62% in the “Intent to Use” dimension, 40% in

the “Perception of Enjoy” dimension, and 23% in the “Perceived Usefulness” dimension. All relationships in the model are meaningful with a 99% confidence level.

Finally, the goodness of fit of the model is evaluated using the standardized mean square (SRMR), Chi-square, and normalized fit index (NFI). Table 4 shows the values obtained, as well as the reference values according to Hu and Bentler (1999).

Table 4. Model adjustment

Indicator	Result	Reference
SRMR	0.063	<0,08
Squared Chi	225.324	<500
NFI	0.785	>0.7

After the validation of the proposed model, an analysis of the acceptance level of the gamifying methodology is carried out. Table 5 shows the average and standard deviations for

each of the items that make up the model. For its interpretation, it should be noted that the scale used has 7 points (1= strongly disagree / 7= strongly agree).



Table 5. Descriptive statistics of the acceptance level of the gamification methodology

Item	Mean	DT
This methodology could improve my learning in the classroom (UP1).	6,43	0,903
The use of this methodology during classes would make it easier for me to understand certain concepts (UP2).	6,50	0,679
I think this methodology is useful when learning (UP3).	6,55	0,597
Using this methodology favors my learning (UP4).	6,30	0,758
I think the methodology is easy to use (FUP1).	5,95	0,815
Learning to use and manage it has not been a problem for me (FUP2).	5,85	1,350
Learning to use and manage this methodology has been clear and understandable to me (FUP3).	6,05	0,959
Using it has been fun for me (PD1).	6,38	0,705
I enjoyed using this methodology (PD2).	6,35	0,802
I think the methodology allows learning by playing (PD3).	6,38	0,774
Using this methodology makes learning more interesting (ACU1).	6,48	0,679
I think it is a good idea to use it in the classroom (ACU2).	5,60	2,521
I would like to use this methodology in the future if I had the opportunity (IU1).	6,50	0,641
I would like to use this methodology to learn both the topics presented to me and other topics (IU2).	6,58	0,594

All items are above 5.6 points, which implies that, in general, the acceptance level of the gamification methodology is high. Specifically, it highlights: usefulness while learning (UP3), learning clarity (FUP3), fun use and playful learning (PD1, PD3), interest in learning

(ACU1), and future intent to research other topics (IU2).

To specify the analysis, a descriptive analysis by dimensions is performed. The results can be seen in Table 6.

Table 6. Descriptive statistics on the acceptance level of the gamifying methodology (dimensions and total)

Dimension	Media	DT
Perceived Usefulness (UP)	6.44	0.73
Perceived Ease of Use (FUP)	5.95	1.04
Perception of Enjoyment (PD)	6.37	0.76
Attitude towards Use (ACU)	5.21	1.60
Use Attempt (UI)	6.54	0.62
Total	6.16	0.91

As can be seen, the students emphasize the intention of use (UI) and perceived usefulness (UP).

4. Discussion and conclusion

Gamification methodology is a useful strategy and with a wide variety of possibilities to facilitate the learning of students in different curricular areas and at different educational levels, from children to university students (Juan-Lázaro



& Area-Moreira, 2021). However, it should be noted that considerable efforts are being made to conduct studies and research with the aim of knowing deeply how students learn through it.

This research determines as a significant model the TAM formulated by Davis (1989). This model proposes that the perceived usefulness toward the technologies and the easy management of these technologies will be able to establish values with respect to the attitude of the subject, being able to direct it toward a specific intention of use. In a virtual learning experience, the results lead to the establishment of one of the first conclusions; teachers perceive the incorporation of the gamifying methodology as an appropriate strategy, highlighting other dimensions of it: perceived ease of use in the classroom, the acceptance of its integration, the transformation of interest in learning, and the positive attitude toward its use in the future, with similar results to those presented by Turpo-Gebera et al. (2021), who state that the successful assessment with the training received online indicates not only a relevant adaptation of resources to their needs, but also the acquisition of higher levels of maturity in the domain of digital competence. With all this, it can be said that the training received by teachers who have participated in this learning experience has developed satisfactorily.

On the other hand, another conclusion that can be derived from this study is that the level of acceptance in terms of the validation of the TAM model is high (Teo et al., 2009; Venkatesh & Bala, 2008). This model has adequate internal consistency with regard to the indicator block. Therefore, the TAM model used is presented as a good predictor to explain the attitude toward gamifying methodology in university education. All of this highlights the significance of the model initially formulated by Davis (1989). In this sense, the results obtained are very much in line with those achieved by Arteaga and Duarte (2010), or Cabero et al. (2018).

Gamification is an active methodology presented as useful that facilitates and improves the learning of students, regardless of the educational stage (Rodríguez-García & Arias-Gago, 2020). However, considerable efforts are being made to carry out studies and research that support their effectiveness and thus to have a thorough understanding of the scope of their work.

Throughout the study, the importance of measuring the degree of acceptance of this technology by teachers has been deepened in order to determine its future usefulness. Despite high simplicity and validity, the TAM model shows some limitations. First, this model refers to usage prediction, but not user performance's increment. Hence, there is no positive relationship between usage and performance. On the other hand, we find the ability to predict the actual use of technology, since this instrument is based on self-report, and finally, the variability of results if the sample is applied to teachers with high proficiency levels.

It can be stated that the model analyzed involves a transformation of traditional methods. It is necessary to rethink the ways in which the competence development of university professors is proposed. All this through different levels and therefore as a constant learning that mobilizes different competitive dimensions ranging from technical domain to ICT innovation (Flores-Lueg & Roig, 2016; He & Zhu, 2017). Even so, it is also necessary to point out different limitations of the study such as the reduced sample number or the specificity of the context where the training proposal is developed. Therefore, it would be interesting to replicate the model in research with the same or different methodology as, for example, the Scape-Room or the Flipped Classroom, since they also have a high educational potential (Cabero-Almenara et al., 2021a, 2021b), or through the incorporation of different technologies, above all, through so-called emerging technologies (Guillén-Gámez et al., 2021; López-Cortés et al., 2021).



Financing

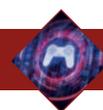
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Perception of gamification strategies in Italian secondary school

Percepción de las estrategias de gamificación en las escuelas secundarias italianas

ib Viviana Malvasi is a PhD student at Universidad Nacional de Educación a Distancia (Spain) (vmalvasi1@alumno.uned.es) (<https://orcid.org/0000-0001-8736-3303>)

ib David Recio-Moreno is a researcher at Universidad Nacional de Educación a Distancia (Spain) (davidrecio@bec.uned.es) (<https://orcid.org/0000-0002-1152-6388>)

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Abstract

Gamification is projected as a challenge for innovation in educational contexts. In recent years, gamified didactic proposals have been developed to support the acquisition of the curricular contents of the subjects. This research aims to make a diagnosis of the level of application of gamification as a didactic strategy in the area of mathematics, based on the perception of teachers and students of secondary schools in Italy. A multi-case study is chosen, which combines quantitative and qualitative techniques, with an exploratory-correlational scope. The data was collected through the questionnaire, completed by 4,845 students, and in-depth interviews with 12 teachers. It was found that the students hardly perceived the use of games, analogue or digital, by the teaching staff. The teachers indicate that they have knowledge of games to facilitate the learning of mathematical concepts. Students do not perceive that gamification didactic strategies are applied consciously. The teaching team claims to use incentives, prizes, and rewards. At the same time, they claim to have little knowledge about gamification and its possibilities. Gamification is attractive as a didactic approach to teaching mathematics. In this sense, the need to offer solid training that establishes the foundations of the game, gamification and the opportunities it offers for the design of learning experiences and game scenarios is highlighted.

Keywords: Gamification, didactic strategies, teaching math, secondary education, learning processes, teaching methods.

Resumen

La gamificación se proyecta como un desafío para la innovación en los contextos educativos. En los últimos años se han desarrollado propuestas didácticas gamificadas para apoyar la adquisición de los contenidos curriculares de las asignaturas. Esta investigación pretende realizar un diagnóstico del nivel de aplicación de la gamificación como estrategia didáctica en el área de matemáticas, a partir de la percepción del profesorado y alumnado de las escuelas secundarias de Italia. Se opta por un estudio multicaso, que combina técnicas cuantitativas y cualitativas, de alcance exploratorio-correlacional. Los datos se recogieron a través del cuestionario, cumplimentado por 4845 estudiantes, y de entrevistas en profundidad a 12 profesores. Se encontró que el alumnado apenas percibe el uso de juegos, analógicos o digitales, por parte del profesorado. El profesorado señala tener un conocimiento sobre juegos para facilitar el aprendizaje de los conceptos matemáticos. El alumnado no aprecia que se apliquen estrategias didácticas de gamificación conscientemente. El equipo docente afirma usar incentivos, premios y recompensas. Al mismo tiempo, manifiestan tener un escaso conocimiento sobre la gamificación y sus posibilidades. La gamificación resulta atractiva como planteamiento didáctico para la enseñanza de las matemáticas. En este sentido, es evidente la necesidad de ofrecer una formación sólida que sienta las bases del juego, de la gamificación y las oportunidades que ofrece para el diseño de experiencias de aprendizaje y escenarios de juego.

Descriptores: Gamificación, estrategias didácticas, enseñanza de las matemáticas, educación secundaria, proceso de aprendizaje, método de enseñanza.

1. Introduction and state-of-the-art

Over the last few years, gamification has projected in different contexts such as advertising and marketing (Huotari & Hamari, 2012; Landers et al., 2017; Zichermann & Linder, 2013), health (González et al., 2016; Hamari & Koivisto, 2015) or education (Domínguez et al., 2013; Qahri-Saremi & Turel, 2016; Villagra-Arnedo et al. 2016). This panorama generated by the growing production of scientific literature in these contexts (Contreras & Eguia, 2016; Chou, 2021; Johnson et al., 2016; Kocakoyun & Ozdamli, 2018; Koivisto & Hamari, 2019; Sardi et al., 2017), has caused general confusion about the definition of gamification (Torres-Toukoumidis et al., 2018).

Since the term gamification emerged, there is no agreement among the scientific community to establish a common definition, as each author takes a particular approach and emphasizes certain aspects. Among the most popular definitions, gamification is understood as the use of game mechanics in a non-playful context (Deterding *et al.*, 2011), as the use of game elements and game design techniques in non-playful environments (Werbach & Hunter, 2012), as a set of tools used in brand initiatives using game elements and mechanics (Zichermann & Linder, 2013) or finally, as the use of game design elements in non-playful contexts (Deterding et al., 2011).

Other definitions are focused on the user experience. In them, gamification is seen as a process to improve a service through gaming experiences in order to assist users in generating overall value (Huotari & Hamari, 2012) and as a use of game elements to get a gaming experience from activities in non-playful contexts (Seaborn & Fels, 2015). These approaches focus on the activities that people must perform to acquire a similar aspect to a game, i.e., to identify them as a game in a playful environment.

Finally, in relation to the different definitions that can be found on gamification, approaches focused on people's behavior and behavior are addressed. In these cases, gamification is understood as the application of strategies, thoughts and game mechanisms in non-playful contexts in order for people to adopt or maintain certain behaviors (Ramírez, 2014). In this sense, Kapp (2012) defines gamification as the use of gameplay mechanics, perceptions, and gambling thoughts to engage people, motivate them to action, support their learning, and solve problems. Zichermann and Cunningham (2011) are committed to understanding it as a process of thought and gameplay to connect with people and solve problems. Given the undeniable benefits of this didactic strategy, methods for its application are currently being developed. For example, Gasca-Hurtado et al. (2017) present a proposal for the evaluation of gamified environments in order to ensure gamified experiences with purposes, objectives, principles and elements that are defined as fundamental components of gamification, i.e., oriented to the definition of a design method for gamified activities.

The literature review shows a poor approach to gamification as a didactic strategy in the teaching of mathematics. Although there are different research or educational experiences that present the results obtained from the implementation of gamification in the primary and secondary education levels (Fernández-Gavira et al., 2018; Pisabarro & Vivaracho, 2018; Quintero et al., 2018), and in higher education (Corchuelo, 2018; Fernández- Antolín et al., 2021; Santos-Ferreira & Lacerda-Santos, 2018; Pérez-López et al., 2017). However, there are different studies that relate gamification to the teaching of mathematics. Tomislav et al. (2018) point out that ludified activities contribute to increasing student performance in learning mathematical concepts. Another study presents an educational project aimed at students to help improve their perception of failure in the area of mathematics by incorporating an interactive mystery game as a



didactic strategy, in which different mathematical contents are applied (Carson, 2021). Widodo and Rahayu (2019) show the results of a study where the students, after using games to work on arithmetic concepts, show a better commitment and a greater emotional connection. In this sense, López et al. (2021) analyze the opinions of the teachers in the area of mathematics, especially in relation to STEM competitions, in Brazilian and Spanish educational centers. In this study, a high percentage of teachers believe that gamified activities have a positive impact in student learning, favoring a greater approach to mathematics and to skills related to this mathematical competence. Finally, Zaharin et al. (2021) explore student perceptions of acceptance, interest, and skills in implementing gamification in mathematic learning processes. The results show a high acceptance when considering gamification as a didactic strategy that benefits the learning of specific mathematical concepts. This connection between games and learning is presented as a line of action for working the curriculum contents in mathematics.

If all of these approaches are taken to the educational field, gamification can be understood as a didactic strategy that can enrich the methodological approaches of professors. An et al. (2021) analyze teacher perceptions of interest, effectiveness, perceived barriers and needs regarding gamified approaches within teaching methodology, particularly in Massive Online Open Courses (MOOC) models. In this case, professors show a high interest in gamification and the elements of the game, motivated by greater interaction and connection with the students. Among the main barriers are lack of time, knowledge of the topic, lack of funding and the poor relationship between specific content and the gamified approach to the didactic approach, requiring expert training.

Far from simplistic approaches of gamification, a global approach is needed that would take into account the essence of the game, as well as the cohesion between the dynamics, elements and mechanics that integrate it. For this

purpose, training is needed to avoid the feeling of insecurity and the need for specific training to face methodological approaches based on gamification (López et al., 2021). In this line, there are different elements to consider when facing the design of a playful learning experience. Following Werbach and Hunter (2012), a sense could be found when incorporating a set of dynamics (narrative, emotional aspects, rules, boundaries, progression or interactions), mechanics (earning rewards and prizes, retro-feeding, challenges, competition, cooperation or collaboration) and components (characters or avatars, badges, ratings, levels, teams, competitions), all this with a series of objectives that the faculty needs to define at the beginning, which will guide the design phase and the final evaluation of the gamified experience that they decide to develop in a specific area and stage. In conclusion, on a more general level, Hossein-Mohand et al. (2021) argue that pedagogical models such as flipped learning and active methodologies such as project-based learning and gamification facilitate the teaching and learning processes of mathematics through the support of technologies that promote the exchange of information and contents, participation and collaboration among students.

Hence, the aim of the research is to discover the perception of students and teachers on gamification as a didactic strategy in the teaching of the curricular contents of mathematics in elementary schools of Italy.

2. Method

The methodological proposal followed by this multicase study (Stake, 2005) aims to explore more than one unit of analysis to provide the basis for its generalization (Rule & Mitchell, 2015). This option provides criteria for internal validity, external validity and reliability of the collected data. In this multicase study, the combination of quantitative and qualitative techniques is presented by a mixed design of



exploratory-correlational scope. Regarding the quantitative design, the instrument used to collect the data is the questionnaire, completed by a total of 4845 students living in 75 of the 80 provinces that make up the territorial organization of Italy. The questionnaire is prepared with specific questions and answers with open and multiple-choice questions. Qualitative methodology (Stake, 2007; Barton et al., 2009; Igartua & Humanes, 2009; Gibbs, 2012) focuses on discourse analysis (Valles, 2000; Iñiguez, 2006; Van Dijk, 2005) with 12 in-depth interviews with teachers in the area of mathematics who teach in high schools.

In order to define the purpose of the study, the following questions are raised for students: do teachers propose digital games in math classes?, does the teacher propose serious (analogue) games?, what games helped to better understand the math content?, do you know games (analogue or digitals) that could be used in math classes? do teachers use awards, or rewards in math to properly perform homework outside the classroom? do math teachers use awards, or rewards for doing correctly the proposed activities in the classroom?

The following questions are raised in relation to the actions performed by teachers: what do they understand by gamification?, how do they rate gamification in terms of its incorporation into their teaching methodology?, have they been trained in terms of this didactic strategy?, do they know or do they suggest any games (analogue or digital) to their students to help or facilitate the learning of mathematics? do they use rewards for their student's work? do they use any digital application to award such rewards? Using the game in educational practice is valued as a way of getting students accustomed to receiving rewards for what they do without striving, what do you think about this statement?

2.1. Objectives and Hypothesis

The above questions allow reflecting of the objective of this study. Formally, the research aims to

diagnose the application level of gamification as a didactic strategy in mathematics, based on the perception of teachers and students in secondary schools in Italy. The formulation of this objective responds to a study that is planned to approach observable phenomena. Several hypotheses that have been tested and formulated by a hypothetical-deductive method are presented:

- Hypothesis 1. Gamification as a didactic strategy in the area of mathematics is perceived by the students in the secondary education of the schools in Italy.
- Hypothesis 2. Gamification as a didactic strategy in the area of mathematics is known by teachers in the secondary education of the schools in Italy.
- Hypothesis 3. Gamification as a didactic strategy in the area of mathematics is applied by teachers in the secondary education of schools in Italy.

2.2. Population and sample

The sample participants correspond to 4845 students in secondary schools who live in Italy; the students are from 13 to 22, and average of 16.43 years. 52% of the people surveyed identify with the female gender and 48% with the male gender. The provinces of residence reached are 75 out of a total of 80, distributed in different geographical areas of Italy: north (60 %), center (7 %), south and islands (33 %). All these people live in more than 800 different localities, 66.6% in a rural area and 33.4% in an urban area. The reduced sample from the central zone was not intentional, but it responds to a request for participation by leaders from the three areas of the country; although, for the most part, they do not provide the questionnaire because of the situation of students during COVID-19.

The teaching team of scientific disciplines involved in the interviews is made up of 12 people. 17% of the people interviewed identify with the male gender, while 83% identify with



the female gender. The ages range from 32 to 59 years. They have from 2 to 33 of teaching experience. At the training level, the sample has enormous potential for study, and it is important to mention that 42% of the people interviewed graduated in Mathematics, 25% in Statistical Sciences, 17% in Physics and 8% in Economics and Computer Engineering respectively, thus, covering all the fields of STEM competences. Geographically, 58% live and work in the north of Italy, 8% live in the center and, finally, 34% in the south and islands.

It should be noted that the school itinerary is divided into three stages: primary school (which is composed of a total of five courses aimed at students between the ages of 6 and 11), first-grade secondary school (consisting of three courses and students from 11 to 14 years old) and second-grade secondary school (which is organized into five courses and the students are from 14 to 19 years old). This education process is structured by a total of 13 academic courses, of which the first ten are compulsory. This research focuses on second-grade high school. The main motivation for directing this research to this stage is based on the low results obtained by students in the area of mathematics, according to established national tests (Invalsi, 2019).

2.3. Instruments

The quantitative part of the study designs a questionnaire structured into closed, open and multiple questions. The independent variables are: gender, age, macro-area, type of school, course and academic performance. As dependent variables, different perspectives are considered that allow answering the questions, objectives and hypothesis of the research.

In order to face the qualitative approach, the idea is to design a semi-structured interview aimed at the privileged observers, collecting personal information such as gender, age, the city in which he/she teaches, the type of the educational center, the years of experience and, finally, the

training degree. The most common teaching methods by teachers and the main difficulties found in their implementation are also analyzed. The Google Forms tool prepares informed consent for the interviewed people to have their approval for recording and subsequent analysis. During the interview, people are encouraged to provide their answers freely, avoiding interrupting their interventions, although at certain times they choose to influence some aspects in order to make the teaching team a clearer answer. To make simple references to the interview and to differentiate the contributions of each of the people interviewed, the “E-Tn°: p.” was codified. In this coding system, reference is made to the interview (E), to the teacher (T), to the specific interview number (n°) and to the page on which the aforementioned event is located (pg.). Therefore, if during the analysis it is required to report information that appears in the first page of the interview to participant 1, it would be coded as follows: E-T1:1.

2.4. Procedure

The quantitative methodological design, corresponding to the questionnaires applied to second-level Italian students in secondary school, and the qualitative methodological design, focused on semi-structured interviews with secondary teachers, facilitate analysis from both perspectives that enrich the process; they were both developed from March 2020 to May 2020. Mixed social science methodologies are therefore applied by combining research techniques, methods, approaches, concepts or quantitative or qualitative language into a single study (Johnson & Onwuegbuzie, 2004). This makes it possible to acquire a greater understanding of what we are studying, encompassing the strengths of both methodologies and analyzing different approaches, combining the data to obtain convergent results (Callejo & Viedma, 2006).

Regarding the preparation of the questionnaires, a form sent to the Italian educational



institutions asking for their collaboration for this research is generated. Once the necessary data is obtained, it is analyzed following the corresponding procedure. First, for quantitative analysis, the .csv data was exported to an Excel file for later interpretation with the IBM SPSS v. 25. Data is entered into the program, assigning numerical values to the responses obtained in the questionnaires, filtering and debugging, selecting the appropriate procedure for calculating the statistics and executing the procedure for obtaining the research reports. The interviews are conducted using Skype and then the transcription, collection and analysis of data related to the objectives and hypotheses are carried out. Finally, a methodological triangulation and comparison of the survey data with the results of the discourse analysis presented in this study is established, respecting all the participants.

2.5. Reliability and Validity

This criterion determines whether the measurement scales of our tool are reliable, understanding reliability as the accuracy of the instrument, taking into account possible errors found in the factor analysis. If errors presented are minor, the

measurement and therefore the study accuracy is higher. To study the reliability of the instrument we have followed the Cronbach α procedure. After analyzing the reliability statistics, Cronbach's α offers a value of 0.65 referring to the gamification items, confirming sufficient reliability.

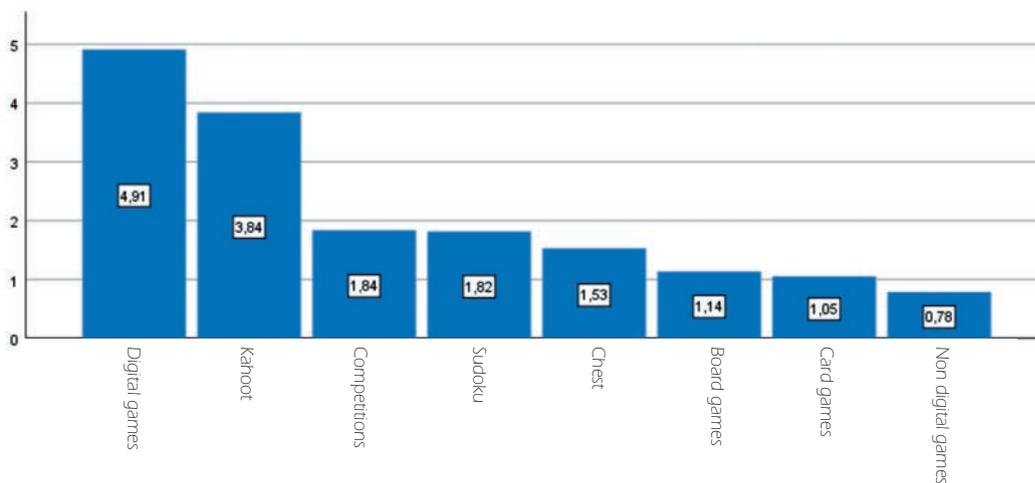
3. Results

The results of the study are presented below in three categories:

Category 1. Math classes: Proposed games versus known games

Regarding the proposal of analogue or digital games in math sessions, students answer negatively with 94% and 95.5% respectively. As for questions about the knowledge of games that favor the understanding of the math content according to the students, the answers show a negative position of 83%, while 6% indicates that they are analogue games (card games, board games, sudokus and chess). 5% say they are digital games, but they do not give examples, 4% point to Kahoot and 2% say competitions (Figure 1).

Figure 1. Games that favor the understanding of math knowledge according to the students



Despite the student's negative response to the question of whether teachers propose analogue or digital grade during math sessions, when asking teachers about whether they know or propose any analogue or digital game to their students that facilitate the learning of mathematics, 75% answer positively by referring to games of brainteasers, competitions between teams, contests or prizes.

We use games like riddles or sudokus. (E-T1: 6)

I organize prize contests or speed competitions in the calculation. (E-T2: 10)

We use Scratch. And then I propose sudokus when there are few students in the class. (E-T3: 15)

I do not use digital, just the Sudoku because we lack of tools. (E-T4: 20)

Logic games. (E-T5: 24)

Math Olympics Games. (E-T7: 32)

During suspension periods of teaching activities and at this DAD stage (E-T8: 35)

Fun problems and puzzles. (E-T9: 39)

I do not use digital, I usually do small contests trying to stimulate them, competitions but without prizes. In fourth grade I wanted to make a competition with derivatives similar to a competition I made that was called 'Don't drink and derive' and they seemed happy. (E-T10: 44)

The difference in the answers between students and teachers may be due to the meaning of the game by students.

Category 2. Perception of the application of didactic gamification strategies according to the students

In order to discover the level of application of the didactic gamification strategies in the area

of thematic programs, the responses of the students are combined with the answers of teachers. Advancing in the incorporation of gamification in the classrooms, understanding it not only as the integration of games but as a methodological change toward a game scenario and experience, it is clear that 81% of students answer negatively and 77% mention that teachers should use rewards for performing homework properly outside the school setting or for doing good exercises and problems in the classroom. The data collected reveal that the perception level of the application of didactic gamification strategies in second-grade secondary schools is low on the part of students.

Category 3. Applying gamification as a didactic strategy by teachers

In relation to the question about the concept of gamification, 67% say they do not know what it is and therefore cannot give an opinion, also because with the length of ministerial programs and the reduction of teaching hours, there is little time to address innovative approaches.

There is little time to try new educational solutions, also considering the numerous educational outings in the area. (E-T3: 15)

I don't know, but I intend to study it. (E-T9: 39)

I don't know.... (E-T2: 10; E-T6: 28; E-T7: 31; E-T10: 44; E-T11: 47; E-T12: 50)

All the people interviewed answer negatively in terms of having received specific training about gamification and its use as a didactic strategy for teaching mathematics, although the research team considers it to be an unconscious or invisible gamification, i.e., the teachers apply it without being aware of it. In fact, to the question addressed to teachers about whether they use rewards or prizes for the work done by their students, 75% of the group answer affirmatively.

I congratulate them or provide them a positive comment, give them a slap in the back to



congratulate them, but I do not reward them (E-T1: 6)

I do it in a playful way. Sometimes I use prizes. For example, I let them decide who to question (joke) or offer immunity for that day to questions as a prize. This lightens the environment in the classroom, strengthens the group within the classroom. (E-T2: 10)

I divided the class into three groups and played the classic question game. The person who answered first was rewarded (and I brought sweets as a reward!). Then, when I explain and assign the exercises, I sometimes propose a very difficult exercise and the first one that does it well has 8 as an oral grade (of course I warn them before). (E-T3: 15)

I use rewards as votes or fewer exercises. Both positive and negative: If you end up being the last you are penalized. (E-T4: 20)

Yes, I usually use rewards. This year I participated in an interdisciplinary project with a second class. The students, divided into Harry Potter film houses, had to present the assigned works each week, receiving points for their homes. Prizes were planned for the end of the year. I do not use digital applications to earn rewards or prizes, but I still find it stimulating to motivate students with rewards, which are later used as an oral vote or an increase in the grade of the written test. (E-T5: 24)

I do not use material rewards, however, sometimes I encourage achievement of goals with grades (to which I realize students are much more attached than I am as a teacher). I often organize challenges in small groups or individual in class with “culinary” awards offered to the winner by the other peers. (E-T8: 36)

Yes, I take this into account in the evaluation in a systematic way. I think this methodology is useful especially when you have an audience of small students, I am thinking about the first two years. With older and more mature students is no longer necessary. (E-T9: 39)

I have not yet implemented it, but I like this method. Even at the school level with competitions between classes. I appreciate the fact that it gives more participation. Frankly, I do not see negative aspects if you apply it in the correct way. (E-T10: 44)

No, but if they do something extremely wrong, I put two, is that valid? (E-T11: 48)

Data collected aimed at teachers at the qualitative stage of the study indicate that each one uses different rewards or awards, not material, which students may not perceive as such. In addition, no digital application is shared to facilitate the use of these elements during the process.

In order to deepen on the concept of the teaching team about gamification, a reflection is proposed on the assessment of the use of the game as a means to direct and instruct the students in the continuous reception for those actions that they perform and reduce with their efforts. 67% of the people interviewed claim not to agree with these postulates, stating that, with the introduction of the game in the teaching processes, striving is funnier.

The game stimulates competitiveness, character formation, respect for rules and roles, knowledge of oneself and others. The Scout method, a well-known pedagogical method, is based on playing. Those who say that the game usually does not strive, perhaps, have never played in their life. (E-T2: 10)

I do not see students learning by learn, they are already studying for voting. That is already the case ‘do ut des’. (E-T3: 15)

You don’t always get a reward, or the reward can also be just verbal congratulation. (E-T4: 20)

However, I think the boys or girls in second-grade high school should be mature enough as to understand that the effort made is for their future and not to receive a reward. The use of games in educational practices should be a plus, but not the foundation. (E-T5: 25)



It might be useful when combined with the traditional method; it does not work like that in the regular basis, you have to get used to trying hard to get to something. (E-T6: 28)

The use of games in the teaching process could be beneficial, but we must be careful. I think it is not ideal to turn it into the only approach, but to alternate the game with moments of work without it. (E-T7: 32)

I do not agree with this statement, as I assume that the reward should be awarded only when the goal is fully achieved. (E-T8: 36)

I do not agree with these studies because you have to know to participate in the competition and play, you have to make an effort. (E-T10: 44)

As can be seen, half of the teaching team positively evaluates the use of games (or its mechanics) in the teaching process, as long as it is not the only educational approach or model.

4. Discussion and conclusions

The results found in this research allow having an approximation to the level of application of gamification as a didactic strategy in mathematics in secondary schools in Italy. At the same time, they allow some conclusions to be highlighted and future lines of research to be established.

Regarding the use of games in math sessions, students do not appreciate that teachers use games, both analogue and digital, in the classroom. Nor do they know about games that favor the acquisition of the math contents. They mention applications such as Kahoot, which are used at some point in the training process. On the other hand, teachers claim to know different types of games as a means to facilitate learning the concepts of the area. They point out games like riddles, competition between teams, contests, and more. This type of gamified activity, as Tomislav et al. (2018), increase performance in relation to the learning of specific math concepts.

Addressing the perception on the use of gamification as a didactic strategy, students point out that they do not appreciate the use of gamified strategies in the math sessions. They do not perceive the use of prizes and rewards in exchange for properly performing homework, both inside and outside the classroom, as well as the exercises and problems presented in the classroom. On the contrary, Zaharin et al. (2021), when studying students' perception, showed a high acceptance and interest in the skills developed through the incorporation of gamification as a strategy for learning mathematical concepts.

Regarding the application of didactic gamification strategies by teachers, the teaching team shows little knowledge about gamification and the opportunities it offers to their professional practice. They claim not to address gamification in their approaches because of lack of time, teaching hours and the situation caused by COVID-19, among other reasons. It is similar to the conclusions of López et al. (2021), when reference is made to further training in methodological approaches based on gamification to increase the safety of teachers and connect the curricular contents of the area through gamification strategies. They also mention not having received specific training on gamification and its implementation in the teaching of mathematics. Although many teachers are not aware of this, they comment on using awards or rewards in their teaching process. In other words, they are not aware of using these elements in their approaches. Students are not aware of the use of these elements either. In this sense, as stated by An et al. (2021), training by gamification experts is necessary to support rigorous teaching approaches in the area of mathematics, as well as to provide more time and flexibility to their proposals, funding, exemplification and resources that support the incorporation of elements of the game in teaching practices.

A limited use of some elements of gamification is perceived, which is closely related to maintaining or acquiring certain behaviors in



students. This idea agrees with Ramirez's contributions (2014), especially when the use of these strategies is aimed at people adopting or maintaining certain behaviors. Most teachers do not agree to grant value to the game as a means of instructing students in receiving rewards only, thus not favoring their effort. In this sense, the application of the didactic strategies of gamification implies an integration of the game and a methodological change toward the design of experiences and play scenarios. They argue that it is a resource, but it is not an educational model.

At the present time in which we observe several gamified didactic experiences developed by professionals in the field of education, the need to avoid the confusion that can be generated about the concept of gamification arises to obtain a clear consensus on its definition, as mentioned by Torres-Toukoumidis et al. (2018). This issue is related to the challenge of providing solid training to teachers that facilitate a consistent design of playful learning experiences to be carried out in different areas and educational stages, all along the lines maintained by Werbach and Hunter (2012), when referring to the coherent incorporation of a set of dynamics, mechanics and components of the game in the design of the different educational proposals in the area of mathematics.

To conclude and with the aim of establishing lines of action and research, gamification is defined as the use of elements, mechanics and dynamics typical of games in a non-playful environment, as defined by different authors in their works, such as (Deterding et al. 2011; Zichermann & Linder, 2013). There are educational experiences based on a gamified system that uses only points, medals and classifications. These approaches place gamification in a reductionist and limited approach, contrary to Kapp's postulate (2012), when it comes to involving, motivating students to action, supporting their learning and solving different problems. When designing recreational learning experiences in school contexts, it should be considered that

this approach should not be unique but that the proposal can be enriched by incorporating other elements such as an initial situation or problem that contextualize the experience, a narrative that serves as a cohesive element and setting (characters, scenarios, facts, events, etc.), an approach to diverse challenges that favor student action, collaboration, and participation to solve problems (Zichermann & Cunningham, 2011). Hossein-Mohand et al. (2021) say that pedagogical models as the flipped classroom, active methodologies and gamification favor the teaching and learning processes of mathematics, along with the support that technological resources can offer in educational practices.

This innovative approach becomes a real challenge for teachers who try to project the game in educational contexts and relates it with learning the curriculum contents of a subject (Domínguez et al., 2013; Qahri-Saremi & Turel, 2016; Villagra-Arnedo et al. 2016), and also for university training institutions to try to achieve a solid training that helps to design and develop recreational proposals that try to relate learning with fun.

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A phone app as an enhancer of students' motivation in a gamification experience in a university context

Una app móvil potencia la motivación del alumnado en una experiencia de gamificación en contexto universitario

ID Carmen Navarro-Mateos is a PhD student at Universidad de Granada (Spain) (carmenavarr@correo.ugr.es)

(<https://orcid.org/0000-0002-0757-7975>)

ID Dr. Isaac J. Pérez-López is a professor and researcher at Universidad de Granada (Spain) (isaacj@ugr.es)

(<https://orcid.org/0000-0002-4156-7762>)

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Abstract

The level of disinterest and lack of motivation in great part of the university student body represent one of the most urgent challenges that the faculty must face nowadays. In this way, there are more and more projects that show the potential of gamification when it comes to increasing motivation and implication of students in their learning process. In close relationship, digital technologies and, specifically, the use of mobile phone devices entail a resource of enormous meaning for young adults and teenagers. Therefore, in the present project we describe the application “\$in TIME”, designed ad hoc with the intention to manage the different elements that defined a gamification project based on the movie “In Time”. This was implemented in the course Basis of Physical Education (a second-year course in the BSc in Science of the Physical Activity and Sports in Granada -Spain-). In the same way, it also shows the repercussion that the participating students had, as well the evaluation they did of it. All of this will allow teaching staff to know a real example, which could help them and inspire them when it comes to designing their future projects and, at the same time, they will count with new evidence of the potential of gamification in education.

Keywords: Physical education, university, motivation, experiential learning, educational technology.

Resumen

Los niveles de desinterés y desmotivación de gran parte del alumnado universitario representan uno de los retos más urgentes que debe afrontar el profesorado en la actualidad. En este sentido, cada vez son más los trabajos que evidencian el potencial de la “gamificación” a la hora de incrementar la motivación e implicación de los estudiantes en su proceso formativo. En estrecha relación con esto, las tecnologías digitales y, concretamente, el uso de dispositivos móviles supone un recurso de enorme significatividad para jóvenes y adolescentes. Por tanto, en este trabajo se describe la aplicación “\$in TIME”, diseñada “ad hoc” con la intención de gestionar los diferentes elementos que conformaron un proyecto de “gamificación” basado en la película “In Time”. Este se implementó en la asignatura Fundamentos de la Educación Física (del segundo curso del grado en Ciencias de la Actividad Física y el Deporte, de la Universidad de Granada-España-). De igual modo, también se muestra la repercusión que tuvo en el alumnado participante, así como la valoración que hicieron de la misma. Todo ello permitirá a los docentes conocer un ejemplo real, que puede servir de ayuda e inspiración a la hora de diseñar sus futuros proyectos y, al mismo tiempo, contar con un nuevo aval del potencial de la “gamificación” en el ámbito educativo.

Descriptor: Educación física, universidad, motivación, aprendizaje activo, tecnología educativa.

1. Introduction

One of the main problems of university education is the lack of motivation of students, which results in a lack of commitment and involvement with their training process (Symonds et al., 2019; Zhao & Hoge, 2005). Due to this reality, approaches that place students at the center of the teaching and learning process are needed to break with the unidirectionality that characterizes the traditional approach and to be able to give them the decision-making capacity to achieve meaningful learning (Gargallo-López et al., 2017; Ituma, 2011). It is in this context that active methodologies emerge to give students the main role in their formative process, bringing the reality of the 21st century closer to the classrooms (McLean & Gibbs, 2010; Crisol-Moya et al., 2020). Scientific evidence shows how, through them, problem solving, critical thinking, analysis capacity, and other complex cognitive skills related to competencies are empowered (Martínez-Hita & Gómez, 2018; Sáiz, 2013).

Gamification, a powerful strategy to motivate and encourage learning, emerged by the continuous search for possible solutions to increase meaningfulness in students (Deterding et al., 2011), understood as the use of mechanics and dynamics of games in non-playful contexts, since, through it, students can increase their interest and commitment to the proposal of the teacher (Kapp, 2012; Zichermann & Cunningham, 2011). In this sense, films and fiction series have now become one of the main and most important sources of entertainment for young people and teenagers (Medina & González, 2013; Scolari et al., 2019). It is in this context that Pérez-López (2018) establishes the concept of “gamification”, i.e., to take advantage in the educational sphere of the key aspects of a film reference to motivate students thanks to the attractiveness and significance that it means to live in first person what they have previously been enjoying as spectators. To do this, the six key aspects that Pérez-López & Navarro-Mateos

(2019) establish in their “Tetris of gamification” must be taken into account: time, esthetics, plots, roles and characters and interactions. This will enhance the credibility of the proposal, causing more “immersion” of students.

If adding the use of mobile devices (used by teenagers on a daily basis) as educational tools, their motivation can increase even further (Brazuelo & Gallego, 2014; Mojarro et al., 2015; Ramírez-Montoya & García-Peñalvo, 2017). In fact, in recent years, the implementation of digital technologies in the various educational stages has increased significantly due to their benefits in the development of creative thinking, problem solving and increased efficiency and productivity, resulting in improved academic outcomes (Adeosun, 2010; Fullan et al., 2018; McMahon, 2009). The university must adapt to this technological development, changing the strategies and activities that arise (Almerich et al., 2021; Fatykhova et al., 2018).

At this stage, it is essential to develop the skills necessary to perform good professional work (Shavelson et al., 2019). This makes the university the perfect stage for the development of digital competence so demanded by today's society, perceiving students that the use of digital technologies is beneficial for their learning and for the development of key competences for their future (Karakoyun & Lindberg, 2020). Therefore, education must create contexts in which students can acquire skills that enable them to critically analyze the information they receive and adapt to the technological developments of our age (Baranowski & Odrowąż-Coates, 2018; Fatykhova et al., 2018; Olszewski & Crompton, 2020; Schmidt et al., 2020).

The aim of this article is to describe a mobile application designed “ad hoc” for the “gamification” project “\$in Time” and to know the student's perceptions, as well as the impact that the student had on motivation.



2. Contextualization

The “gamification” project called “\$in Time” was carried out in the subject called Fundamentals of Physical Education, conducted during the second semester of the second year of the Degree in Science of Physical Activity and Sport (University of Granada). This six-credit subject is compulsory. The main objectives of the project are shown below:

- Know how to plan Physical Education (PE) in the secondary stage following the principles of vertical and horizontal ranking.
 - Know, design and manage the main elements of the curriculum: objectives, content and timing.
 - Plan a school course with teaching units according to the educational objectives
 - Review and analyze reports of innovations and experiences in the PE, applying them to the planning of the PE.
- Contents include:
- Fundamentals of Education. Physical Education.
 - The role of the teacher in the educational framework and society. Core competencies.
 - Sport and physical activity as a vehicle for general training of the individual in society. Intervene to educate on values.
 - Fundamentals of Physical Education Planning.

- Innovation: The Engine of Practical Knowledge in Education.

3. Narrative

The setting of the proposal is based on Andrew Niccol’s film “In Time.” In 2117 the evolution of humanity has reached such a point that it has succeeded in defusing the gene of aging from the age of 18. But, as a counterpart, they only have one more year of life since then, unless they work to accumulate or recover a little more time.

In this learning experience called “\$in TIME” (whose logo can be seen in Figure 1) the “Metronomist” is the owner of the bank of time, conditioning the lives of the inhabitants of the city. He is the one who determines his wages, taxes, interest on any loan, etc., by modifying them to his whim. Its main purpose is to make the rich richer and the poor poorer every day. In this sense, to keep the citizens of the “Ghetto of Feni” (the students) under control they use the “minuterros”, a band of thugs in their service that survive by stealing time from ordinary people so that they do not have to work. Therefore, the idea is that life is time and time is an opportunity to enrich life through learning (to gain life, enjoying it) and, in turn, its “currency” of exchange to be able to buy, for example, food (represented by the performance of formative challenges) and water (creative challenges). Depending on how that time is used, students could increase their life time.

Figure 1. Project logo



4. The role of digital technologies

In the film, people had a time counter on their forearm that was marking their remaining life time. In the project they carried it on their mobile phone, since a web app for the mobile was developed as a complement to the project from which the whole subject was managed (Figure 2).

Thanks to the app, they were able to recreate many of the emotions experienced by the characters of the film, having to plan them-

selves—one of the objectives of the subject—in the best possible way to avoid running out of time and “die” (suspend). In fact, their first objective within the adventure was to prevent their time counter from reaching zero, which would allow them to become “Trojans of Education”, the final goal of the project. At the same time, they had to try to locate the “Metronomist” in order to recover all the time he stole them and to be able to share it among the rest of the inhabitants of the city in order to stop living with the pressure of time permanently.

Figure 2. Home screen and main menu of the “Sin TIME” app



The app made it possible to manage different activities typical in the life of a person, or a future teacher in this case, divided into six major categories with their corresponding subsections. Each of these will be described below to understand its operation and potential:

Work

- Work day: students could track through “Twitter” the accounts of relevant people in the field of PE and Education in general, with the aim of taking advantage of the learning provided by this social network, at the same time, share what has been lived and learned, which are essential aspects in a future teacher. The use of “Twitter” helps to positively predispose students and share through this network “microblogging” fragments of their lives, communicate with other colleagues and experts in certain fields, foster collaboration, organize the class, reflect and evaluate (Tang & Hew, 2017).
- Labor inspection: The “Guardian of Time” (professor of the subject) sent a question from time to time (which came to them as



a message/warning) and they had to answer it as soon as possible by entering the corresponding section of the app. After the first six correct answers the app indicated that the response time had ended, and those who had responded on time would increase their life time.

- Extra pay: The “Guardian of Time” proposed a challenge and those who wanted to accept it should enter the appropriate section of the app and check OK. After the first six affirmative answers, the possibility of accessing this bonus of life time that was

achieved by those who resolved it properly was closed.

- Innovation project: in this section “districts” (groups) were to upload their innovation project (Figure 3), where all the learning acquired during the adventure was collected, and which had to be presented to the “Clan of the Temporizers” (former students and students who had studied the Master for Professors), who determined, together with the “Guardian of Time”, its quality and the corresponding increase in their life.

Figure 3. Example of two innovation projects carried out by the students



Leisure

- Sport: this section was connected to the “Runtastic” application and allowed players (students) to download the sessions they were doing, running or riding a bike, and to get time bonuses for it.
- Bets: they had the possibility to bet on life time on the different group activities that

were done in practical sessions, which consisted of physical-sports challenges.

- Holiday: There was the possibility of getting a letter that allowed to stop the time counter for a week.

Altruism

- Donate: They were given the opportunity to give time to other colleagues whose time counter was approaching 0.
- Mines: it consisted of locating a “mine” (QR code) around the city before a certain time to prevent everyone from reducing their life time. They had the possibility to

buy a track in exchange for time or to buy the corresponding chart. If they did, the lifetime bonus was divided by the number of players who had located it during the set time.

- Friends: They could communicate with other colleagues through a chat without



leaving the app, or upload photos of what they did in the different face-to-face sessions they had, or those relevant moments

Feeding

Here is a parallelism between eating with the conduction of formative challenges and the need to be hydrated with the approach of creative challenges, where they could buy food/challenge, considered most appropriate at each moment

Loans

Players could submit a loan application to the “Metronomist” with the amount of time requested and the number of repayment terms. Depending on the amount of life time requested, the counterpart—interest—was different.

Appointment

In this section they had a calendar to be able to request appointments with the “Guardian of Time” and to solve, for example, any question related to the different challenges they had to overcome in the adventure. One important aspect, and highly valued by the participating students, is that they did not have a single chance of delivering the challenges they decided to face.

Happiness

This section gave students the opportunity to make people around them a little happier (family and friends). For this, they committed themselves to making “PDFs” (happiness projects) altruistically, with all the planning and dedication required (Pérez-López, 2019).

In addition, there is also a “Player” section in the application that includes an individual and “district” (group) classification, the level of each participant based on the achievements and evidence they showed of their learning, or points of experience. The latter could be exchanged for different letters of privilege to make life more wearable within the adventure, such as:

they would like to share with the rest of the citizens of the “Ghetto of Feni” and with the “Guardian of Time.”

(thus favoring the rhythm of learning of each one), as if they were in a supermarket, and after it they would obtain a longer life according to its quality.

Life time increased after the approval of the “Metronomist”, but failure to comply with the counterpart adequately within the time limit increased the penalty.

As they were learning and improving their training, they could try to solve again any of those already done by encouraging their creativity, among other things. Moreover, these appointments costed life time, which increased their value and use, giving the value that it deserves to the time invested in training aspects.

- The letter “free of minutereros”, thanks to which it was not necessary to “hide” for a week, since during that time they could not “steal” time.
- The “dual benefit” letter, which allowed anyone who had it to double their time in the last challenge.

5. Analysis and Interpretation of Student s' Perceptions

To learn about the students' feelings, learning and reflections, a link to “Google Drive” was available in which they could anonymously share everything they liked. In addition, many of them



referred to the project in their personal social media accounts. Below are some examples that they shared on “Twitter” about what this learning experience meant for them, in short:

- “A real way to learn. Thank you #Isaac for all you have made us live #ProjectSinTime”.
- “This is just the beginning!! Education Trojan with a lot to learn and with a desire to do it!! #ProjectSinTime”.
- “The end is at the beginning! Incredible learning experience lived in this semester; this is education! #ProjectSinTime”.

On the other hand, in the fragments shared below, it can be seen the motivation that the students had to have an application created “ad hoc” for the project, facilitating them the follow-up of the adventure, as shown by Julio (all the names used are fictitious, since the source of the information was anonymous):

Every day I get more motivated with the app. It is something I would have never expected of a professor, who would design something like that for students. One example is that I have never liked to run, but today I have done it motivated by the app and I loved it, and I have been able to enjoy beautiful viewpoints. Another highlight is the large number of sections it includes. We can manage everything related to the subject from it, it seems incredible, it is great!

In this same line is the testimony of Lucia:

The app is amazing, it takes care of every detail. It was time for a professor to show me that there is another way to do things and more importantly, I would like to return to class as soon as I leave. Each class goes so fast. Thank you for letting me see me and reflect on how different things can be done. In addition, between the time counter and the history of all our movements during the adventure I had never had so much “feedback” or so detailed feedback in a subject. It is great!

One of the main challenges of every professor is to connect the student to the subject (beyond class hours). Taking advantage of what is significant for students, such as the use of mobile devices, can increase their willingness and motivation to do so. In fact, a good example is Peter’s reflection:

I know that you are getting me to spend a lot more time on this subject than any other, but thanks to the app you have made us being permanently connected to the subject. Also, it has so many sections and many of them are so common, that I almost use them more than “WhatsApp” or “Instagram”. I don’t believe it haha!

Rosa indicates the same:

I’m looking forward to having the app on my mobile now! It is incredible the hard work it has, but it is more incredible that WE ARE ALL looking forward to getting to work and being really hooked on the subject. Personally, this is the first time that I have a subject like this and it has motivated me a lot. I have already told you that I will do my best!

These results agree with other research in which different apps and mobile devices were used to improve the motivation and quality of learning in different university courses (Pechenkina et al., 2017; Weibs et al., 2019).

As indicated at the beginning, in “gamification” it is key to recreate the sensations and emotions of the film to increase “immersion” and credibility (Pérez-López & Navarro-Mateos, 2019). As stated by Fernando, thanks to the time counter included in the app, students lived emotions similar to those of the protagonists of “In Time”:

What a tension is generating the app for me! If you wanted us to manage emotions, you got it. You’re getting me to take advantage of the time like I’ve never done it before, I already



plan the smallest detail of my day. If I ever tell my parents they would not believe it.

The latter shows the great acceptance of the mobile app within the project. In addition, it should be noted that the group that participated in the “gamification” proposal significantly improved its cardiorespiratory fitness, an important parameter to the health of the students, compared to the group that followed a traditional learning methodology (Mora-González et al., 2020). In this regard, more and more research is found in the scientific literature that take advantage of mobile devices and the use of game elements to improve the levels of physical activity (Cotton & Pattel, 2019) and the health and quality of life of different populations, such as elderly patients or with conditions such as hypertension, obesity or autism (Cechetti et al., 2019; Kappen et al., 2016; Lee et al., 2018; Mâsse et al., 2020; Ryan et al., 2017).

6. Conclusions

The possibilities offered by the use of technologies and mobile devices in the educational field are evident, thus enriching a “gamification” experience. By including significant aspects for the students, their motivation and involvement are influenced, which leads to an increase in learning. Thanks to the application that was designed for this project, the students had the opportunity to be continuously connected to the subject, going beyond class time. In addition, it was possible to manage all aspects related to the project and, in particular, the adventure they were experiencing (requesting tutorials, delivering challenges, receiving “feedback”, consulting with other colleagues, etc.).

Finally, it is necessary to highlight the importance of generating sensations and emotions similar to those of the protagonists of the film in this type of project, since it will increase the “immersion”, favoring their involvement and commitment with their training. In this case,

the main emotion lived by the protagonists of the film “In Time” is the continuous pressure of time and its necessary use to continue alive. The students had to manage many emotions and plan their time appropriately in order to be able to enjoy the experience to the maximum. All these learning, when relating them to different emotions, as expressed by neuroeducation (Mora, 2017), are more rooted and significant.

Looking at future lines of work, it would be interesting to continue to analyze the potential of narrative and esthetic elements in apps that aim to influence health-related variables, and where adherence is a fundamental factor. Building an “immersive” experience, which goes beyond extrinsic elements such as points or classifications, motivation and the different sensations lived will increase that commitment with the idea that it will favor the acquisition of the stated objectives.

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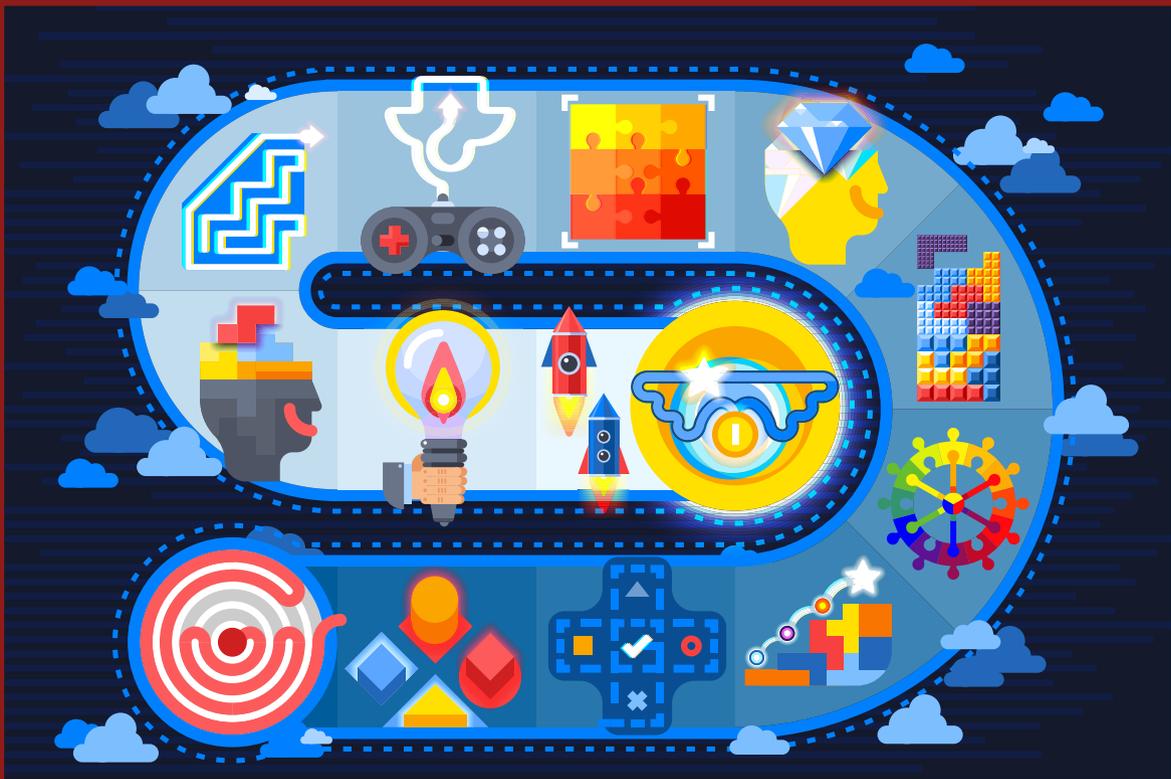


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Miscellaneous Section

(Sección Miscelánea)



Source: <https://www.shutterstock.com/es/image-vector/gamification-techniques-business-education-behavior-change-795756976>



Service-learning in higher education between Spain and Mexico. Towards the SDGs

Aprendizaje servicio en educación superior entre España y México. Hacia los ODS

- Dr. Fernando González-Alonso** is a professor and researcher at Universidad Pontificia de Salamanca (Spain) (fgonzalezal@upsa.es) (<https://orcid.org/0000-0002-6507-3433>)
- Dra. Azucena Ochoa-Cervantes** is a professor and researcher at Universidad Autónoma de Querétaro (Mexico) (azus@uaq.mx) (<https://orcid.org/0000-0003-4515-9069>)
- Dr. José Luis Guzón-Nestar** is a professor at CES Don Bosco-Universidad Complutense de Madrid (Spain) y del San Pío X - Universidad Pontificia de Salamanca (Spain) (jguzon70@gmail.com) (<https://orcid.org/0000-0002-1526-5058>)

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Abstract

The article considers university Service Learning (SL) between Spain and Mexico, in the absence of literary reviews on SL and with the aim of generating motivation and commitment, through the experiences proposed and analyzed. For which, it addresses the roots, the philosophical and pedagogical foundations and the models that articulate and justify it as elements of great interest and relevance. Identify PHC experiences, designed by Universities in Spain and Mexico, that respond to the dimensions that are proposed and tend to the Sustainable Development Goals (SDG), in order to know, analyze, compare and value them. The experiences are applied by university students, with the support of network organizations, as a service to the community, in vulnerable social sectors of childhood, adolescence and youth, indigenous communities, women, etc. The students experience a remarkable learning, by adding theory and practice in real situations, related to art and cultural heritage, physical education, teacher training, environmental and civic education, solidarity participation, gender equality and psychopedagogical development and support. It shows a referential and prospective framework, turning the SL of both shores into cooperative strategies of teaching, services and socio-educational learning, which bring university and society closer together; for academic improvement, personal and group growth and civic and democratic participation, favoring the commitment to social justice and the progressive achievement of the SDGs.

Keywords: Service-Learning, higher education, social service, Spain, Mexico, Sustainable Development Goals.

Resumen

El artículo considera el Aprendizaje Servicio (ApS) universitario entre España y México, ante la inexistencia de revisiones literarias sobre el ApS y con la finalidad de generar motivación y compromiso, a través de las experiencias propuestas y analizadas. Para lo cual, aborda las raíces, los fundamentos filosóficos y pedagógicos y los modelos que lo articulan y justifican como elementos de sumo interés y actualidad. Identifica experiencias de ApS, diseñadas desde universidades de España y México, que respondan a las dimensiones que se proponen y tiendan a los Objetivos para el Desarrollo Sostenible (ODS), para conocerlas, analizarlas, compararlas y valorarlas. Las experiencias son aplicadas por estudiantes universitarios, con el apoyo de organismos en red, como servicio a la comunidad, en sectores sociales vulnerables de infancia, adolescencia y juventud, de comunidades indígenas, mujer, etc. El alumnado experimenta un notorio aprendizaje, al sumar teoría y práctica en situaciones reales, relacionadas con arte y patrimonio cultural, educación física, formación de maestros, educación ambiental y ciudadana, participación solidaria, igualdad de género y el desarrollo y acompañamiento psicopedagógico. Muestra un marco referencial y prospectivo, convirtiendo el ApS de las dos orillas, en estrategias cooperativas de enseñanza, servicios y aprendizajes socioeducativos, que acercan universidad y sociedad, para la mejora académica, el crecimiento personal y grupal y la participación cívica y democrática, favoreciendo el compromiso hacia la justicia social y el logro progresivo de los ODS.

Descriptores: Aprendizaje-Servicio, educación superior, servicio social, España, México, Objetivos Desarrollo Sostenible.

1. Introduction

A few decades ago, Service Learning (SL) as an innovative technique was on the periphery of academia, and today it has spread virtually throughout higher education. Few experiences of educational innovation have achieved such rapid and global success (Deeley, 2016).

In this article the historical and philosophical-pedagogical foundations of SL are initially described, and reference is made to meaningful experiences that make us better understand its history and future. Subsequently, a literature review of SL developed from higher education as a community service to more vulnerable individuals and groups is carried out. SL experiences have been developed in universities in Spain and Mexico, demonstrating its solidarity projects within the context of Sustainable Development Goals (SDGs) in the 2030 Agenda.

From the article by Robert Sigmon *Service-learning: Three Principles* (1979) that originated this methodology and helped to establish and formalize it, numerous definitions of SL have been offered. Some of the most cited are:

SL is an educational experience linked to university in which students participate in an organized volunteer activity that meets the identified community needs and reflects around the activity, so that a further understanding of the course content is obtained as well as a more global appreciation of discipline and a better sense of civic responsibility. (Bringle & Hatcher, 1996, p. 221)

SL is a method by which students learn and develop through active participation in a carefully organized service carried out in a community and that meets their needs and is coordinated with a higher education institution and the community; it helps to foster civic responsibility; it integrates and improves students' academic curriculum and includes structured time for students to... reflect on the service experience. (Corporation for National and Community Service, 1993)

Finally, Ehrlich (1996) argues that:

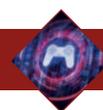
SL joins community service and academic study to empower each other. The basic theory of SL is that of Dewey: the interaction of knowledge and skills with experience is key to learning. Learning begins with a problem and continues to apply complex ideas and sophisticated skills to increasingly complicated problems. (p. 3)

The various definitions converge in a consensus on the essential elements of SL pedagogy:

- Integration of learning objectives and service objectives.
- Completing academic learning objectives with civic learning objectives (citizenship education) and also with other learning categories (personal growth, professional development, intercultural competence, ethical research, research skills).
- Organized and structured process.
- Mutual collaboration between students, teachers, community members, and institutions that meet collective goals and build capacity among all.
- Critical reflection.
- Duration and intensity to produce significant SL results.

From a historical perspective, SL is a relatively new process in higher education. The term was first coined in 1967, in reference to a program of internships that was sponsored by the Southern Regional Education Board (USA), and through which university students obtained academic credits and/or a federal-funded remuneration to work on community projects (Sigmon, 1979).

As a pedagogical practice in higher education, SL limited to a small group of participants until mid-1980. In the end, SL was gaining adherents and distinguished itself clearly from community services, because of its attention



to the integration of the service with academic study (Hollander et al., 2001).

The 90s have witnessed a great growth in SL, so it is now seen as a “vital force in educational change” (Liu, 1996, p. XI). Schools and universities have made a renewed commitment to civic responsibility and SL as a central vehicle for fulfilling the commitment (Ehrlich, 2000).

2. Philosophical and pedagogical foundations of SL

SL is a collaborative and democratic teaching-learning strategy designed to promote academic improvement, personal growth and civic learning and to foster social commitment. In it, students interact with community members, teachers, administration and service staff, in experiences related to academic material and to issues of public interest. Through guided reflection, students critically examine their experiences and articulate specific and applicable learning outcomes, thereby improving the quality of their learning and service. Students, faculty, and community members serve as co-educators, co-learners, co-servers, and co-generators of knowledge (Bringle et al., 2011).

The development of SL initiatives has been accompanied by a renewed interest in Dewey's philosophy, whose writings on the active nature and the benefits and conditions of participatory democracy “provide an early theoretical foundation for a pedagogy in which students are cooperatively committed to solving problems” (Speck & Hoppe, 2004, p. 19). Dewey (1859-1952), emphasize the importance of experience to the human being and especially in the field of education: *Experience and Objective Idealism* (1907) and *Experience and Nature* (1925). Dewey points out that:

Learning from experience involves establishing an active link between behavior and its consequences. It is an activity that opposes the traditional model of education, in which stu-

dents are imbued with passivity. Active learning through experience is advocated, based on the belief that ‘most learning is not the result of instruction. It is rather the result of free participation in a significant scenario’ (Illich, 1971, p. 39). [...] Dewey criticizes this type of education and advocates for a more progressive pedagogy, in which the student has opportunities to become actively involved in his or her own learning. Active participation concerns experience. It is not experience in itself because it must be educational, and it is only educational when significant knowledge is acquired. (Deeley, 2016, p. 51)

However, it is not possible to think that Dewey's philosophy is the only foundation (Giles & Eiler, 1994), there are others to explore. Therefore, it is appropriate to state that SL is a philosophy of “growth and human purpose, a social vision, a community approach, and a way of knowing” (Kendall, 1990, p. 23). It is a pedagogy:

Based on experience as a basis for learning and on the intentionality of reflection designed to allow learning to happen, it is based on the work of researchers and learning theorists, including Dewey, Piaget, Lewin, Schon and Kolb, who believe that we learn through combinations of action and reflection. (Jacoby, 2003, p. 4)

Dewey's contribution should be considered, which especially “criticizes the uncritical reproduction of knowledge and believes that students should learn to solve problems competently or develop an ‘attitude of the mind leading to good judgment’” (Deeley, 2016, p. 51).

It gives importance to the creation of meaning, to the relationship between thought and language. Therefore, it is also important to consider Vygotsky (1962) since social constructivism is very alive in its foundations. Deeley (2016) states:

Social constructivism, or social construct theory, is a valuable component within the theo-



retical framework of SL. This also includes the theory of personal construction, which deals with how people understand or make sense of their personal experiences. [...] Through critical reflection on their experiences and academic work, it is clear that students modify and deconstruct their starting ideas about themselves and their understanding of the world. (p. 41)

On the other hand, collaborative learning is used again in SL, which is “relevant in a theoretical paradigm of SL because students are necessarily involved in a process of sharing reflective thinking within a small group mentoring environment” (Deeley, 2016, p. 44).

Although SL is primarily aimed at the university world, we include the field of adult learning in the construction of its paradigm. Following Knowles and Jarvis, this innovative technique has components of this type of learning, because the life experience can lead adults to question why and how they learn (Deeley, 2016, p. 54).

Another influence of SL is the theory of transformative learning. Transformation is often not the heritage of early education, but adults. When we talk about partnerships and transformations between campuses and communities, we mean significant changes in the way universities understand the world. “Transformation promises a greater holistic and coherent understanding of our common situations” (Jacoby, 2003, p. 39). Thus, the key factors of transformative learning include experience, critical reflection and development (Merriam et al., 2007).

There are other visions that have been projected on SL. For example, those who think it is based on critical theory and feminist pedagogy (Brown 2001; Deans, 1999). As Freire (1967) and Shor (1987) point out, critical theory emphasizes that education is political and should include a dialectical approach to problem-making and a critique of social systems and civil responsibilities of education. Feminist pedagogy also advocates the need for critical reflections and a dialog

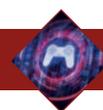
related to the educational aspects of privilege and power (Weiler, 1991). These models point to the importance of placing SL in the context of social issues and challenges. Community-based research and participation development in SL are examples of how these pedagogies support community promotion, and give voice to the community with its strengths and needs (Strand et al., 2003; Reardon, 1998). In addition to the use of social learning and cognitive learning models, recent advances in the theoretical framework of SL and the construction of its paradigm include the use of a pedagogy of commitment (Lowery et al., 2006) and SL as a postmodern pedagogy (Butin, 2005).

Like Jacoby (2003), SL can be expected not to become:

Something educational that researchers document in a historical review published in 2030 as a passing fad, an innovative pedagogy that disappeared as corporate influences rebuilt the modern university into an efficient vehicle for delivering standardized education at low cost, but highly profitable (p. 39)

SL philosophies and initiatives integrate previous models and historically add other emerging paradigms that emerge in practice. It is a good example of the spirit that should be in our educational communities in search of promotion and transformation practices.

SL, its philosophical-pedagogical background and foundations, places us in a panorama of SL experiences that have evolved, as explained by Speck and Hoppe (2004) toward basic models: *philanthropic*, based on charity and philanthropy, in the face of social problems, mitigated by altruism and justice; the model of *civic participation*, where teachers and students are the agents who teach and serve society civically and democratically; and the *community*, projected in the local community, safeguarding virtues and rights. Later, García-Romero and Lalueza (2019) consider three theoretical frameworks on which the university SL is classified: 1) *experien-*



tial learning, centered on the learner who learns and finds meaning in what he/she does for the community; 2) *transformative learning*, which has to produce dissonance and new vocabulary because of the radical change that occurs; and 3) *critical theories*, with a pedagogy projected to community transformation.

3. SL experiences: Methodology, Dimensions and Objectives for Sustainable Development

This paper is documental research. As part of the methodology, the SL experiences are based on the models presented that integrate a mixed one, encompassing altruistic action, participative in the educational environment with social community projection and experiential and transformative learning.

We identified eight university SL experiences, four from Spain and four from Mexico, countries of our cultural origin and professional interest with SL projection, to know them, analyze them and evaluate them comparatively through concrete dimensions and indicators, since most of publications focus on the theoretical framework (Chiva et al., 2016; Zayas et al., 2018; Rodríguez-Izquierdo, 2020). Among the SL experiences published, we selected those proposed as an articulated project from the university, with recognition and institutional support that stand out for their identifying elements, health problems, education, culture, environment, etc., with reference to the Sustainable

Development Goals (SDGs) (ONU, PNUD, 2015).

We connected SL experiences with the 2030 SDGs Agenda because they share goals that ensure peace and progress for the most vulnerable societies, as the 17 SDGs seek to end poverty (1) and hunger (2); ensure healthy living (3), inclusive, equitable, quality education and lifelong learning (4); support the availability and sustainability of water, sanitation (6) and affordable and safe energy (7); promote sustained and sustainable economic growth, full, productive and decent employment (8); foster peaceful and inclusive societies, equitable access to justice and the creation of effective and responsible institutions (16); promote terrestrial ecosystems and sustainable forests, land degradation and loss of biological diversity (15). They aim for gender equality and the empowerment of women and girls (5); provide inclusive, safe and sustainable cities and human settlements (11); reduce inequality between countries (10); ensure sustainable consumption and production (12); promote inclusive and sustainable infrastructures and industries (9); they combat climate change and its effects (13), the sustainability of oceans, seas and marine resources (14); they seek to reduce inequality between countries and revitalize the partnership for development (17).

In the experiences of SL, we use dimensions and indicators as criteria for analysis and assessment (Bellera et al., 2014; Campo, 2015; Escofet et al., 2016) from Table 1.

Table 1. Dimensions for the assessment of SL university experiences

1. Educational planning	2. Learning	3. Service	4. Participation
5. Competencies	6. Axiology and values	7. Networking and University	8. Vocational and professional
9. Coordination, evaluation and satisfaction			

Own elaboration from Bellera et al., 2014; Campo, 2015; Escofet et al., 2016.



4. SL experiences at universities in Spain

Some SL experiences designed at university degrees in Spain aim to solve social demands and needs, demonstrating identifying elements and analyzing experiences from the dimensions indicated. The application of ApuniS projects allows participants to live unique and meaningful real experiences with formative and vocational projection, and achievement of active citizenship in favor of the community (Pérez-Galván & Ochoa, 2017).

4.1. SL: A library for children's school

Students from the last year of Children's Education at the Autonomous University of Barcelona applied a SL project (González et al., 2015) creating a children's library for a school with students from two to six, during external practices. They learn as future teachers by analyzing needs, systematizing information, presenting the project and budget to the school's management team, deciding on methodology and resources, and doing a service to the institution. The network of work and collaboration is between the university community, trainees, school authorities, parents and library members.

Coordination between the agencies is provided through group meetings and the planning of activities, such as visits to the library, presentation of norms and their operation, elaboration of pictographs and photos, organization of books and drawings. Children are the beneficiaries and are motivated by interrelationship and participation in the project; they acquire competencies when searching for and managing information and working as a team. It directly influences the credits of the subject of Practicum, showing educational and social values. The project has a vocational and professional character toward the competencies of the teacher, perceived in the final evaluation. SDGs such as inclusive education, the promotion of learning opportunities and peace-

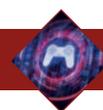
ful and inclusive societies, gender equality and women's empowerment are achieved.

4.2. SL: The Art of Learning Art. SL to build professional identity

Gregori-Giralt and Menéndez-Varela (2014) mention the SL experience based on the design of art projects by students of subjects of basic training of the degrees of Fine Arts at the University of Barcelona. As artists, designers and art conservatives, they guided their projects to solve some of the difficulties of the community, analyzing their needs, and applying the knowledge of the subject. Project ratings were improved based on the professional identity of groups with social commitment. They achieved the dimensions of pedagogical planning, learning and service in the vision and mission of the world around them; institutional linkage and vocational awareness and identity. They achieved SDGs such as inclusive, equitable, quality education and learning and reduction of inequalities, etc. Experience shows cooperative planning and learning around art, design and conservation. It highlights the high social and artistic value, the involvement and support of the university, transcending the consciousness and professional identity that connects art with more excluded human groups.

4.3. SL: A teacher for Datem

"A teacher for the Datem" is a SL experience, in which students from the Faculty of Education of the Pontifical University of Salamanca (UPSA) participate as external practices. Following a university model of education in values (Alonso & de Castro, 2015; Martín-García et al., 2021), they collaborate in a network on the project of the Marcelino Champagnat University of Lima (UMCH), along with the ONGD SED and the Institute of Marist Studies (IEM), among others. The service is provided to students from indigenous communities of seven ethnic groups:



Achuar, Awajun, Chapra, Shawi, Quechua, Wampis and Kanz, together with mestizos, who have attended for seven years during holidays in San Lorenzo, province of Datem del Marañon in the Peruvian Amazon, twice a year, once to deliver academic work (December and August) and another to get classes (January).

The project is attended by more than 500 indigenous adults from Initial Education and Primary Education (Pérez, 2015) to obtain the degree that allows them to train and maintain the place in schools of their communities in the jungle of Peru. In January, UPSA students, along with other peers, develop teaching practices for subjects they have prepared. They conduct domestic tasks that praise coexistence. On the part of UMCH, the students of UPSA receive information, materials, program of activities, support and necessary training for the development of their functions in respect of purposes, norms and confidentiality, without any consideration, seeking the best of students.

The learning of students is based on the role exercised, the acquired competencies, the socio-educational values and the quality of the planned service. Vocational and professional awareness is observed in the teaching activity, with high satisfaction rates. Experience with the SDGs: they reduce poverty, ensure inclusive, equitable and quality education, reduce inequality, achieve inclusive, secure and sustainable human settlements, and strengthen means of implementation, revitalizing the global partnership for sustainable development.

4.4. SL: Physical education for youth with intellectual disabilities

The SL experience (Santos-Pastor et al., 2018) developed a physical education and sport project for youth with intellectual disability from the Promotor Program (training for the employment inclusion of youth with intellectual disability). Students and their professors of the CAFyD degree and Primary Education of physi-

cal education of the Autonomous University of Madrid formed a network with planned elementary physical education sessions, developing roles that favored the learning and the service of others. Participation, motivation, values and competencies achieved are confirmed in the assessment based on a questionnaire and diary, which reveal satisfaction and improvements. The SDGs were achieved, ensuring a healthier and better life; inclusive, equitable, quality and opportunity education; and more inclusive, resilient, and sustainable human settlements.

5. SL Experiences at Universities in Mexico

- Social service in Mexico is mandatory for all Higher Education students to have a degree in any career. It originated in the context of the Mexican Revolution (1910) and is implemented as a way of compensating the shortcomings and inequalities that arise as a result of this movement. According to Mungaray et al. (2002), social service in Mexican Higher Education was constituted as a spontaneous activity of high solidarity and reciprocity by university students. Article 5 of the Constitution was amended in 1945, establishing “the compulsory social service for students of higher education, making it a basic institution of social development in Mexico” (p. 33).

At present, social service remains as a mandatory requirement to obtain a professional title, in accordance with the provisions of the General Education Law, so future professionals must fulfill 480 hours of service. However, although it can be identified as a background, not all university social service programs are characterized as SL projects, due to the fact that they are not always explicitly linked to learning and that each institution determines the mechanisms for developing it.



Two social service practices were chosen in this article, although they are not named as SL, but still have elements to be considered as such. Two others are described, where the authors explicitly take the SL. The dimensions and indicators described were followed for analysis and assessment.

5.1. SL in Environmental Education Interventions

The document “Experiences of Intervention in Environmental Education are based on Guerrero Communities” (Figueroa et al., 2016), take social service of three generations of students at the University of Guerrero Regional Development degree (UAGRO). It describes the analysis of the contribution of social service projects to the field of sustainable environmental education.

Interventions focus on environmental education workshops: training for vegetable production, solid waste management and the construction of ecological stoves for women. These interventions contribute to the SDGs by ensuring a healthy life and promoting well-being for all; ensuring inclusive, equitable and quality education and promoting learning opportunities; guaranteeing access to affordable, safe, sustainable and modern energy; and ensuring sustainable consumption and production.

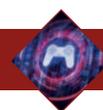
As for pedagogical planning, lessons focused on specific content on environmental education and health are observed, and they relate sustainability to human and animal health. The service is clearly defined in the construction of stoves, where students made agreements with the community to diagnose health, affected by respiratory problems associated with smoke inhalation of the cooking rings not only of the construction of the stoves, but a training program in the environment and health. The experience reflects the role of the students in giving answers from the knowledge they had, in carrying out all the activities and their logistics, contributing to their vision of learning and of

the world as they are very vulnerable communities in poor regions and with major educational and social problems in Mexico. The importance of the relation between university and community by the horizontal relationship is observed, in order to achieve learning through the service that met real needs. It should be noted that, as they relate to social service practices, we do not observe processes of reflection and evaluation as a substantial part of SL projects.

5.2. SL on solidarity participation and gender equity

An article conducted by Quiroga (2013) from the University of Monterrey (UDEM), reports the impact of SL methodology on women’s empowerment. The intervention carried out by students of the undergraduate course in Clinical Psychology developed a program to boost women’s decision-making capacity. The learning objectives focused on identifying and diagnosing behavioral, cognitive, emotional, and social problems. Quantitative data were measured on the rate and severity of partner violence in adult women who attend community service spaces and psychological variables, which moderate and mediate their presence. The activities were carried out along with the DIF (Integral Development of the Family), an agency of the federal and state government.

This experience contributes to “achieving gender equality by empowering all women and girls” as SDGs, even if it is not explicit. Because the article focuses on showing the impact of the intervention, we cannot report the project process. Strategies guaranteeing quality service were included, such as participatory diagnosis with beneficiary institutions; teacher counseling; links with community organizations; and planned and managed activities.



5.3. SL in the implementation of public policy for children

López-Villarreal (2018) published the article “Learning Service in the implementation of public policy for children” from the University of Monterrey, describing an intervention carried out with methodology linked to the subject of Learning Theories, by strengthening:

The psychopedagogic of eight foster homes through the development of pedagogical manuals focused on the educational needs of children who live in these institutions (...). The experience analyzes the relationships among students who favored citizen education by implementing SL as a public policy process. (p. 1)

It is inferred that neither the process nor the results are described. The achievements of the SDGs are inclusive, equitable and quality education and peaceful and inclusive societies for sustainable development and access to justice.

5.4. SL on the “Adopt a friend” Program

There are 55 institutions of Higher Education (IES) participating in the international program of social service PERAJ “adopt a friend”. The objective is to support the psychosocial development of primary school students by accompanying young university students through tutoring, providing academic guidance, improving self-esteem, social skills and increasing their life horizon to overcome social and educational lag. The program contributes to the SDGs: ensuring a healthy life and promoting well-being for all ages; ensuring inclusive, equitable and quality education; and promoting lifelong learning opportunities, although not explicit. The service of university students is well defined, focusing on the reduction of psychosocial risks, the strengthening of social cohesion and the promotion of integral training and social commitment.

In the review, two articles that show the impact of this program on university education were found. The first called UADY-Peraj Social Service Program Evaluation “adopt a friend” (Santoyo, 2017), although it does not describe how to do it, it shows the positive impact on elementary students and the author’s discussion of redefining the time and duration of the program’s development. Regarding the study “analysis of the impact of the social program UBP Peraj “adopt a friend” with students of the Polytechnic University of the Bicentennial (Gómez & Escobedo, 2019), it focuses on the evaluation of the students, highlighting their honesty, active listening, patience and social commitment.

6. Conclusions

In light of the nature of SL (origin and purpose), we support SL as a collaborative and democratic teaching-learning strategy designed to promote academic improvement, personal growth and civic learning. It promotes public needs, in which students interact with community and university members in experiences, both academic and public interest. In the end, one of the most important objectives of SL is to bring the university closer to society.

SL university experiences like these enrich the entire university community and those who participate in one way or another, creating a true cooperative work network, which reveals the vocational and professionalizing sense toward community and mutual learning.

In the Spanish university aspect, unlike the Mexican, this type of experience is sometimes linked to the practice of subjects, and in others it is voluntary. SL experience is not always associated with the recognition of training credits.

Reviewing SL in Mexico, there is a lack of systematization of experiences, both of social service and SL in the IES. If starting that systematization allows us to sort and classify the experiences to check their planning, definition



and dimensions of action, to learn from the successes and errors, and thus to build learning and improve the practices, in Mexico we have a great way to go. In order to be able to account for the improvement of the introduction of this SL methodology which, although it has a long tradition, apparently it has not permeated the proposals for educational innovation of the IES. Moreover, it is necessary to evaluate and reconsider the university social service, since the lack of systematization does not allow to assess whether the objectives are met.

The matching dimensions of SL experiences in both countries highlight those related to learning, service, competencies, participation and evaluation. In the Spanish case, planning, management, systematization and networking are also outstanding.

Among the SDGs, those that appear in experiences of a marked educational and inclusive nature must be highlighted: ensuring inclusive, equitable and quality education and promoting learning opportunities; achieving gender equality; empowering women and girls; promoting peaceful and inclusive societies for sustainable development and facilitating access to justice. Other SDGs, such as ending hunger; securing water; economic growth; infrastructure and industrialization; ocean and sea conservation, remain absent from the aims of the proposed SL.

The recipients of SL experiences in the two countries are people of excluded social groups such as the intellectual disabled, minors, women, indigenous people, etc., through actions of environmental and citizen education, equality and empowerment, psychopedagogic and social development, accompaniment and guidance, thus bringing the SDGs closer to people with the same rights.

In general, SL experiences create educational and curricular sustainability at the university, which is strengthened in its sense, purpose, social inclusion and solidarity. Similarly, they favor the knowledge, awareness, commit-

ment and progressive achievement of the SDGs through the planned actions.

Future work on SL may focus on the approximation or distance of known models, the follow-up of SL agents from their early school to their current university experience, as well as the review toward the conceptual change produced about SL. From the philosophical and pedagogical foundation, it is interesting to review the elements applied, as well as to continue the achievement of the SDGs from the experiences of SL.

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Learning monitoring at low-income schools in COVID-19 context

Monitoreo de aprendizajes en escuelas públicas chilenas en contexto COVID-19

- Dra. María Verónica Leiva-Guerrero** is a professor at Pontificia Universidad Católica de Valparaíso (Chile) (veronica.leiva@pucv.cl) ([https:// orcid.org/ 0000-0002-7641-0087](https://orcid.org/0000-0002-7641-0087))
- Jimena Ivonne Sanhueza-Mansilla** is a professor at Pontificia Universidad Católica de Valparaíso (Chile) (jimena.sanhueza@pucv.cl) ([https:// orcid.org/ 0000-0002-9279-421X](https://orcid.org/0000-0002-9279-421X))
- María Paz Soto-Calderón** is a professor at Pontificia Universidad Católica de Valparaíso (Chile) (maria.soto.c@pucv.cl) ([https:// orcid.org/ 0000-0002-7165-1578](https://orcid.org/0000-0002-7165-1578))
- María Eliana Muñoz-Lameles** is a professor at Pontificia Universidad Católica de Valparaíso (Chile) (maria.munoz.l@pucv.cl) ([https:// orcid.org/ 0000-0002-8784-8535](https://orcid.org/0000-0002-8784-8535))

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Abstract

Nowadays, in pandemic context, education has been conditioned to break with the daily school's routine and has engaged to different alternatives to implement changes, especially those related to evaluation. Schools are challenged to follow new guidelines which are issued by the Ministry of Education, such as Priorización Curricular and new learning contexts at home. In this research, it is of a great interest to analyze how to incorporate the process of monitoring and learning assessment in the context of non-face-to-face classes during the pandemic in Chile? This article aim is to analyze the process of monitoring learning in 50 Chilean public schools during covid-19 context. The public schools which have been selected, are part of the Sumo Primero en Terreno program that is implemented by the Ministry of Education (MINEDUC) and the Pontificia Universidad Católica de Valparaíso (PUCV). The methodology is qualitative; interviews were answered by the management teams of these schools. The most relevant conclusions are a wide range of conceptions and monitoring purposes that school leaders have, the systematic nature of the monitoring process, its frequency and the tools to carry it out, the overuse of the multimedia systems and digital gadgets (WhatsApp, telephone, mail and social networks), as well as the difficulties that they face to organize different approaches to guarantee learning to each student.

Keywords: Learning monitoring, formative assessment, distance education, feedback, COVID-19.

Resumen

En el actual contexto de pandemia se ha condicionado la escolaridad, rompiendo con las pautas cotidianas de las escuelas y comprometiendo alternativas paliativas para la puesta en marcha, especialmente las relativas a la evaluación. Las escuelas se ven desafiadas a un seguimiento dimanado del Ministerio de Educación, como la priorización curricular y escenarios de aprendizaje en casa. En este contexto resulta de interés analizar cómo incorporar el proceso de monitoreo y evaluación de aprendizajes en clases no presenciales durante la pandemia, en escuelas públicas de Chile. Para ello, se han seleccionado 50 escuelas públicas que son parte del programa Sumo Primero en Terreno. La metodología de tipo cualitativa se basa en entrevistas en profundidad a los equipos directivos de estas escuelas. Las conclusiones más relevantes son la diversidad de concepciones y finalidades del monitoreo que tienen los directivos, la sistematicidad del mismo en su frecuencia y en las herramientas para llevarlo a cabo, la concentración de la comunicación en el uso de los medios de comunicación WhatsApp, teléfono, mail y redes sociales, así como las dificultades para sistematizar fórmulas que atiendan a la variedad y singularidad de todos y cada uno de sus estudiantes.

Descriptorios: Monitoreo de aprendizajes, evaluación formativa, educación a distancia, retroalimentación, COVID-19.

1. Introduction

The ECLAC-UNESCO “Education in the Time of COVID-19” report is categorical in noting that the pandemic has strongly impacted the development of the educational process in almost all regions of the world, bringing consequences that will mainly affect those students and families with less socio-economic opportunities (MINEDUC, 2020b; Murillo & Duk, 2020; Rieble & Viteri, 2020; Zhao, 2020). The pandemic caused millions of schools to close their doors during 2020, having to restructure their educational processes, so as to welcome students with remote or hybrid learning activities, using digital devices or printed material to continue the teaching and learning process. The different solutions adopted to address the distance education process have depended on the capacities and resources available to each nation (Álvarez et al., 2020; Bos et al., 2020).

Chile, like many of the world’s countries, was not prepared to provide virtual education, reason for which all the processes deployed have caused great challenges to the education system, especially for the management teams and teachers. Not only did they have to design strategies to organize the virtual school year, but they also had to distribute their leadership to foster the development of new teaching capacities and respond to the student’s emerging school and socio-emotional needs (Harris & Jones, 2020). For their part, teachers had to quickly learn to use various technological platforms and modify their pedagogical and evaluative strategies for their classes.

At the same time, several organizations recommended to support management and teaching in schools, such as: improve access to technologies, develop collaboration, promote socio-emotional well-being, strengthen professional development in teaching, create an enabling environment for learning and establish trust relationships among all actors in the school community (Propuestas Educación Mesa Social

Covid-19, 2020b; Reimers & Schleicher, 2020, Propuestas Educación trabajo interuniversitario mesa social 3B COVID 19, 2020).

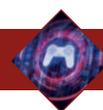
On the other hand, the Ministry of Education of Chile (MINEDUC) has implemented measures to continue the educational process, among which connectivity is highlighted, as well as access to technological devices of students and the definition of a prioritized curriculum that emphasizes essential objectives that must be achieved by the student at each educational level to respond to the reduction of the face-to-face school year, in addition to adapting the curriculum to the context of each school (MINEDUC, 2020b). Because of the latter, the management teams established new forms of monitoring to demonstrate reliably how students are learning. This article addresses the process of learning monitoring in 50 public schools during the pandemic, with the aim of enriching the discussion and reflection on the subject.

1.1. Learning monitoring during COVID-19

School management teams and teachers have had to overcome several challenges during 2020 and one of the key aspects is monitoring in this new scenario, in which students and teachers have stayed in their homes and conducted educational work. Ulloa and Gajardo (2017) argue that “monitoring is primarily understood as the search for coherence between what is planned and what is actually taught” (p.13), the latter being the most difficult aspect to determine in schools, since a permanent evaluation is required (Nercellas, 2016).

For Guach and Peña (1995) monitoring is:

A continuous process that accompanies and is part of professional praxis where observation, feedback, critical and reflective debate takes place on the teacher’s performance in the classroom and its impact on the learning of students, as well as in the training and



development of professional competencies that contribute to an efficient practice. (p. 4)

Mokate (2003) states that “the purpose of monitoring is to detect timely the strengths and weaknesses of implementation processes in order to make adjustments conducive to optimal management of initiatives” (p. 8). Because of the pandemic, it is clear that these adjustments are necessary to better cope with changes in educational processes given the need to stay at home and continue with the educational process.

The Ministry of Education of Chile in its Framework for Good School Leadership establishes a specific dimension for the monitoring process, noting that management teams must: “Monitor the comprehensive implementation of the curriculum and learning achievements in all the educational fields of students for the improvement of teaching processes and pedagogical management” (MINEDUC, 2015, p. 25). This is very complex in times of pandemic, because many of the students do not have internet access to participate in online classes, which required the management and teaching teams for the development of different ways to reach students with learning activities for a prioritized and flexible curriculum in the schools (MINEDUC, 2016; MINEDUC, 2020a). However, the return of learning activities by students is low, either because of connectivity problems, because of their geographical location, socio-emotional and economic status, among others, so that the students’ learning cannot be really evidenced.

In this regard, a study conducted by the Ministry of Education and the World Bank in August 2020 found that only 27% of students in vulnerable schools had school coverage (MINEDUC, 2020b). In this reality, the knowledge of demographic data by the schools is relevant to determine which students should be given the most support and in which areas the aid should be targeted, adapting educational processes to the context of the pandemic

and impacting on educational improvement (Agencia de la Calidad, 2018a). In this sense, the feedback is relevant, since students must “receive timely and clear feedback to define the aspects achieved, the procedural errors encountered in a task, and the steps to be taken to advance the learning in progress” (Educación, 2020, 2020, p. 7).

These new monitoring strategies should emphasize the diversification of the teaching of all students, which was a challenge for the teachers and management teams who had to integrate the pedagogical use of video calls. These were carried out through various platforms such as Zoom, Google Meet, WhatsApp, Teems, among others, adapting the educational material and incorporating rubrics with new spaces for instructions, feedback and self-evaluation or co-evaluation (Gálvez & Crino, 2020).

1.2. Formative assessment for learning monitoring

One of the key aspects of the new pandemic scenario for learning monitoring is to evaluate students effectively to show what they are learning and give feedback on time. It is in this context that formative evaluation is relevant, which allows in a timely manner and in the educational process to strengthen the students’ learning (Hebles et al., 2017; Castillo & Cabrerizo, 2009; Foster, 2017). Anijovich and Cappelletti (2017) state that the formative evaluation focus on the students to adapt teaching practices. In Chile, the Decree 67 of the Ministry of Education establishes.

On the one hand, to strengthen the integration of formative evaluation into teaching in order to diagnose and monitor in a more constant and systematic way the students’ learning, making pedagogical decisions in a timely manner; and, on the other hand, to enrich the way in which it is summarily evaluated and qualified, to better represent and communicate learning and to contribute to motivat-



ing and supporting the learning of students. (MINEDUC, 2018, p.10).

The fact is that evaluation is called to be an activity necessary to account for the quality of the educational process and the results of teaching and learning (Förster & Zepeda, 2017). To do this, educational institutions must stop using hetero-evaluations, with a focus on the summation and the qualification, and move toward a participative, formative evaluation, with the presence of self-evaluations for self-regulation of learning from the students (Anijovich, 2017; Educación 2020, 2020; Mottier, 2010). In addition to installing in schools an evaluative culture that involves making a paradigm shift from the importance of qualification and summative evaluations to learning processes and formative evaluations (Popham, 2013). In this regard, Anjovich and Capelletti highlight the pedagogical role of formative evaluation, since “it provides useful information to reorient teaching (if necessary)” (2017, p. 12), and invites the constant feedback and accompaniment of students in the construction of essential learning (MINEDUC, 2020a). “Good feedback accelerates learning because it produces motivation and commitment to learning and encourages learning and improving” (MINEDUC, 2020a, p. 5). For its part, UNESCO (2020), referring to evaluation for learning monitoring, points out that the aspects of confinement, anxiety, socio-economic and educational gaps must be taken into account in order to provide feedback to students during the learning process.

Therefore, the flexibility in a remote education from the curricular and evaluative perspective implies an articulated and integrated work between managers, teachers, students, families, subjects and the digital to strengthen processes of responsibility and self-regulation in students. Thus the evaluation, as part of the monitoring of learning, can be seen as the “process that feeds back all actors involved in educa-

tion and even the educational system as such” (Escobar, 2014, p. 127).

2. Method

The objective of this research is to describe how Chilean school management teams address the learning tracking process in the context of the COVID-19 pandemic, during the 2020 school year. This study is part of a larger project called Sumo Primero that aims to develop competencies for curriculum management in public school management teams, located in the XVI regions of the Chilean territorial organization. The research was conducted with a qualitative methodology (Flick, 2015).

2.1. Design

A descriptive methodological design (Maxwell, 2005) was used to carry out the research with the application of an in-depth group interview (Valles, 1999; Holstein & Gubrium, 1995), with the purpose of knowing how the management teams, composed of Chief of Pedagogical Technical Unit (position of pedagogical leadership that in Chile is carried out both by women and men) and Director of educational institutions in the country, address the monitoring of the learning of students during COVID-19. After applying the interviews and transcribing them, categories were assigned to the responses using ATLAS.ti 9; these categories emerged by grouping related elements that responded to the objectives proposed for this research, starting with an open coding to identify the broader themes. From this, an axial coding was constructed to recognize the most relevant relationships and identify the key and “critical” aspects in response to the questions that guided the research. Two researchers independently analyzed the corpus of data. Once the categories were agreed, they codified the textual corpus to establish reliability.



2.2. Participants

The study population included the 200 Chilean public schools participating in the Sumo Primero program in 2020, of which the non-probabilistic, intentional sample (Latorre et al., 2003) consisted of 50 schools which agreed to participate in the interview, meeting the criteria of insufficient and low average categorization of the school establishment according to the Education

Quality Agency (Agencia de la Calidad de la Educación, 2019), geographical representation (schools located in the north, center and south of the country), participation in interview of both key actors of the management team: Director and Head of Pedagogical Technical Unit. Prior to the interview, the participants signed an informed consent. Table 1 characterizes the participating schools where the management teams work.

Table 1. Characterization of the fifty public schools categorized as insufficient or medium-low, in which the management teams of the research work, Chile, 2020

N°	Region	Commune	Category	N°	Region	Commune	Category
1	Region of Tarapacá	Iquique	Medium Low	26	Región de Valparaíso	Quilpué	Medium-Low
2	Region of Tarapacá	Iquique	Medium Low	27	Región de Valparaíso	Quilpué	Medium-Low
3	Region of Antofagasta	Antofagasta	Medium Low	28	Región de Valparaíso	Valparaíso	Insufficient
4	Region of Antofagasta	Antofagasta	Medium Low	29	Región de O'Higgins	Rancagua	Medium-Low
5	Region of Antofagasta	Antofagasta	Medium Low	30	Región del Maule	San Clemente	Insufficient
6	Region of Antofagasta	Antofagasta	Insufficient	31	Región del Maule	Villa Alegre	Insufficient
7	Region of Atacama	Chañaral	Medium Low	32	Región del Maule	Talca	Medium-Low
8	Region of Atacama	Freirina	Medium Low	33	Región del Ñuble	Chillán	Medium-Low
9	Region of Atacama	Chañaral	Medium Low	34	Región del Ñuble	Pinto	Medium-Low
10	Region of Coquimbo	La Serena	Medium Low	35	Región del Bío Bío	Santa Bárbara	Medium-Low
11	Region of Coquimbo	La Serena	Medium Low	36	Región del Bío Bío	Lebu	Medium-Low
12	Region of Coquimbo	La Serena	Medium Low	37	Región de Aysén	Coyhaique	Medium-Low
13	Region of Coquimbo	La Higuera	Medium Low	38	Región de Aysén	Coyhaique	Medium Low



N°	Región	Comuna	Categoría	N°	Región	Comuna	Categoría
14	Region of Coquimbo	Vicuña	Medium Low	39	Región de Aysén	Aysén	Medium-Low
15	Region of Coquimbo	Ovalle	Medium Low	40	Región Metropolitana	Macul	Medium-Low
16	Region of Coquimbo	Ovalle	Medium Low	41	Región Metropolitana	La cisterna	Insufficient
17	Region of Coquimbo	Punitaqui	Insufficient	42	Región Metropolitana	Lo Prado	Insufficient
18	Region of Coquimbo	Illapel	Insufficient	43	Región Metropolitana	San José de Maipo	Medium-Low
19	Region of Coquimbo	Illapel	Medium Low	44	Región Metropolitana	El Bosque	Medium-Low
20	Region of Coquimbo	Salamanca	Medium Low	45	Región Metropolitana	Peñaflor	Medium-Low
21	Region of Coquimbo	Monte Patria	Medium Low	46	Región Metropolitana	Peñaflor	Insufficient
22	Region of Coquimbo	Coquimbo	Medium Low	47	Región Metropolitana	Peñaflor	Medium-Low
23	Region of Valparaíso	San Esteban	Medium Low	48	Región Metropolitana	Peñaflor	Insufficient
24	Region of Valparaíso	Quilpué	Medium Low	49	Región Metropolitana	La Florida	Medium-Low
25	Region of Valparaíso	Panquehue	Medium Low	50	Región Metropolitana	Talagante	Medium Low

Source: Sistema de Gestión Programa Sumo Primero en Terreno. <https://bit.ly/3r8hKxB>

2.3. Tool

An in-depth interview was applied in virtual mode through the Google Meet platform, which was recorded with the tool system. This interview was conducted in an hour and thirty-minute session, using the active-reflective technique (Valles, 1999; Hostein & Gubrium, 1995). This implies an interaction in which participants, interviewees, and interviewers are assumed to be openly interacting, guided by flexible conversation questions. The questions raised were: How do you understand learning monitoring in the context of a pandemic, how often do you implement

learning monitoring at school? And what are the difficulties in implementing pandemic monitoring at school? The creation of the questions was done by the team of researchers according to the research question of the study on how the management teams approach the learning monitoring in a health crisis situation by COVID-19? All interviews were recorded and transcribed in an integrated way for further processing and analysis. For transcription and recording of information, the recommendations of MacLellan et al. (2003) were followed.

The information was processed through a thematic content analysis (Valles, 1999; Bardin,



1986). Both deductive and inductive categories were considered. The first were derived from the revised literature. The inductive categories consider the findings obtained (Mayring, 2000). Due to the volume of information involved in the responses of the 50 interviews, a code book (MacQueen et al., 1998) was created which guided the group's analysis work, where researchers analyzed the corpus of data independently to later agree on the categories raised and proceed to textual coding. Atlas.ti software was used to perform qualitative data analysis (Friese, 2017).

3. Results and discussion

3.1. Monitoring of Management Learning during the Pandemic

Regarding how the school's UTP principals and heads of schools understand monitoring in the context of a pandemic, they mainly point out that it is a relevant process of information from and about student learning, which is collected in the educational process by introducing feedback and the necessary adjustments to improve programming. In addition, it involves reflection and decision-making as a result of the information found in this monitoring process.

Monitoring is understood and visualized in the different stages of our students' development and in the different learning levels to be developed online. Monitoring is relevant, and is done through digital resources. Monitoring the learning process and evaluating achievement, from a formative perspective, allows adjustments to be made, updated information to be obtained, and feedback students. (ED897)

Monitoring is very important, since information that will allow analysis and use of evidence can be collected to track the progress of each of the students; it also affects the outcome of the learning, the continuous improvement of teaching processes and allows to observe the progress and deficit to make immediate feedback. The formal evaluation is focused on

the accomplishments expected and achieved by students. It must provide evidence that is believed and is useful for the decision-making with learners. It allows teachers to improve practice. (ED1245)

However, other managers view it as a complex process for online classes; also, as bureaucratic with supervision orientation and with the only purpose of establishing compliance of the program.

Monitoring is a continuous, ongoing and systematic process that occurs along with the teaching-learning process by monitoring curriculum compliance. (ED1893)

It is understood as one more barrier within the difficult scenario of the process. On the one hand, it is thought that the registration of evidence is somewhat cumbersome (registration forms) and on the other, the evaluation appears to be one of the major complications of the process, considering that the evaluation must be carried out synchronously (for which there are no resources on the part of the holder). (ED489)

Monitoring and evaluation are complex process within the new guidelines and the process involved in distance education, considering that there is no physical contact and interaction that should occur between teacher and student. (ED10753)

In this regard, we observe two views on the part of the management teams on monitoring learning during pandemic, some understand it from a more quantitative perspective, emphasizing the amount of learning obtained without considering how and for what such learning was achieved, and others, more qualitatively, by emphasizing advances and achievements in a much more descriptive way, considering the characteristics of students, their individual differences and consulting the results in pedagogical decision-making. In addition, controversy is observed, understanding teacher-focused monitoring as the process that accounts for compli-

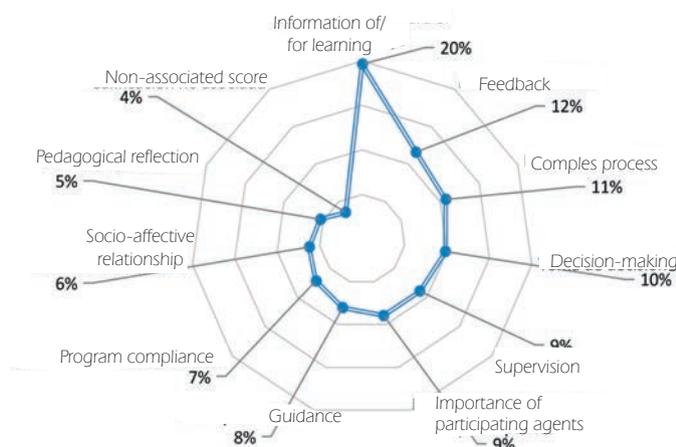


ance with the curriculum or as a supervision of tasks and/or activities performed by students, reason for which management teams need to ensure planning—with time and materials—for achieving goals that they must monitor, accompany, and feed back in order to understand

and explain their students' learning outcomes (Volante et al., 2015).

Figure 1 shows the categories generated from the responses of the management teams on understanding the learning monitoring during COVID-19.

Figure 1. Categories found on how they include monitoring, chief of UTP and principals of 50 public schools in Chile, 2020



Finally, the understanding of feedback, guidance and socio-affective bonds are identified as emerging elements, which are related and key for monitoring to be carried out alongside the participation of the family/guardians, such as that of students, which it is pointed out sometimes as scarce. In this regard, Education 2020 (2020), states that it is necessary to constantly provide feedback to students, giving a clear definition of those to be evaluated and how this process will be carried out, generating conversations and agreements with students, making calls or video calls, promoting self-evaluation or co-evaluation.

3.2. How and how often the management teams implement learning monitoring

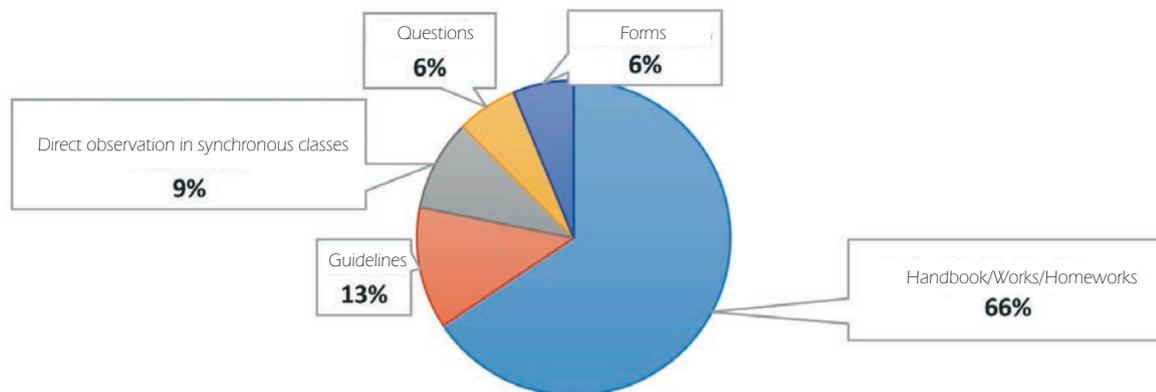
Regarding the implementation of monitoring, elements linked to pedagogical resources such

as media are evidenced in the management discourse; understanding that distance education set the pedagogical framework. Out of the most used pedagogical resources were the guides, works and/or tasks (66 %) as strategies for evidencing performances that allow to carry out a learning monitoring. Later, there are the subcategories guidelines (13%) as a resource to systematize what students have done, and these indicate dichotomously the presence or absence of an action at a higher level of depth that would allow to account for a descriptor or level of performance of a given task. Direct observation in synchronous classes (9 %) is followed, which varies since the adaptations of both teaching and students to understand this new system as a learning environment indicates in greater or lesser average their adaptation to implement monitoring. In addition to having connectivity and technological resources irregularly. Finally, the sub-category questions (6%) and forms (6%)



focuses on pedagogical resources that are used at some point in the synchronous or asynchronous classroom to know the understanding level of any learning objective and/or the existence of concerns, doubts, among other information relevant to learning achievement (see Figure 2).

Figure 2. Strategies of how 50 Chilean public schools implement learning monitoring, 2020



Based on MIDE UCE results, 2020.

The most common and used media by the management teams in the implementation of monitoring is WhatsApp app (32%) given its versatility as a communication vehicle, because it allows to send and write messages, audios, images, videos and/or video calls. Followed by phone call (25%), virtual platforms and/or social networks (18%), video calls (14%) and email (11%). It is noted that most of the media mentioned are virtual and therefore require an internet connection depending on the telecommunications company that provides data to use certain applications and social networks.

The latter agrees with what is proposed by MIDE UC, i.e., to feedback and monitor learning by all available means: calls, short videos, text messages, WhatsApp, written comments, especially with the students who most require help, feed them directly through calls so that they have the certainty that they have understood the instructions and can clarify their doubts immediately (MIDE UC, 2020).

Undoubtedly, monitoring in a context of non-classroom classes involves innovating in virtual evaluative strategies where the student must be the protagonist in the assessment of his/

her learning; however, online evaluation remains a pending task with insufficient development in teachers (Maureira et al., 2020).

In relation to the frequency of the learning monitoring in schools, most (28 %) would be done daily and (28 %) biweekly, weekly (16 %) and to a lesser extent monthly (4 %). It is striking that the managers of some schools were unable to clearly specify the frequency (24%), pointing out that it depends on each teacher, showing that there would be no institutional definition about the times at which such a process should be carried out.

We need to specify an institutional guideline on how and when to monitor the learning of students in the difficult scenario of online classes due to Covid. (ED8348)

It should not be forgotten that the monitoring process allows “to lay the foundation for pedagogical decision-making regarding teaching and learning processes” (MINEDUC, 2016, p. 3).



3.3. Difficulties in implementing monitoring during pandemic

67% of the management teams report that the main difficulty in implementing monitoring in the context of a pandemic is the diverse educational conditions of the pandemic itself, due to the different synchronous and asynchronous modalities that have been implemented the classes, the geographical location of the schools, the emotional and uncertain environment of children and their families, which is another difficulty (33%) arising from the use of digital and virtual resources that allow to maintain synchronous or asynchronous communication with the students.

This health crisis is presented as a difficult process that allows us to observe the participation and fellowship of students who live a difficult period, which is more relevant than the curriculum implemented. (ED114)

Because of the pandemic, it has been difficult to have a better performance of this type of assessment. (ED4356)

The means by which remote work is done have not helped. (ED306)

The difficulty of systematically monitoring learning during pandemic has been to have digital resources and inputs to address the emotional state of students, which is the result of the pandemic itself. (ED2119)

We do not have the digital tools to enable us to perform these processes because of the connectivity problems of students and their families. Some teachers have been able to monitor and apply some training evaluations, but not in all cases, not all subject teachers, as remote work is led by head teachers. (ED11704)

In addition to the findings presented, Murillo and Duck (2020) raise that the difficulties for the educational process during pandemic, beyond the connectivity problems, are

the management of the digital world. In a high percentage, schools in Latin America do not have the conditions and skills to take on the challenge of online education.

On the other hand, it is essential, in these crisis contexts involving distance education, to incorporate other evaluative agents such as students and families, through strengthening and raising awareness of self-assessment and link with families who observe student performance at home. In this regard, Aguilar-Gordón (2020), points out that one of the challenges for the fulfillment of the role of the family in the learning process:

Is permanent communication to foster participation, collaboration, problem solving, balanced use of social networks and other technological inputs, the issuance of ideas, feelings and thoughts according to the needs and interests of children and young people. (p. 222)

Finally, the difficulties in being able to monitor what students have actually learned in a pandemic context, which involved a synchronous and asynchronous, non-face teaching and learning process, require rethinking and deepening on more qualitative evaluative practices, where students must have more autonomy through instruments that invite reflection and self-regulation of their learning as self-evaluations and rubrics. Thus, the assessment is not exclusively focused on teachers, but also on students who engage in the process and establish assessments about their own performance (Moreno, 2021).

4. Conclusions

The learning monitoring is a basic and necessary condition in every educational context, being instituted as an unavoidable pedagogical principle that must have its didactic and practical application in every teaching-learning situation. In the current pandemic conditions suffered since 2020, which has led to the dispersion of didactic-pedagogical contexts, with closed classrooms and an assisted use of



alternative methodologies, especially those that could be implemented by virtual systems, with unequal effects by social condition, availability of resources, socio-economic conditions of families, geographical dissemination and distance from schools, has turned the application of ordinary interaction systems in a very complex situation, both for the educational management, and for the schools. Therefore, alternatives for educational interaction can be sought from the analyzed process of learning monitoring, which requires a wide variety of initiatives because of their diversity, according to the specific needs of each student, and the personal circumstances of each student.

However, when it comes to conceptualizing this process on the part of managers, there is a great diversity of conceptions, almost all of them associated with the aspects of supervision, information, animation and/or accountability, being only that the fifth part focuses such action on learning as a mechanism for guiding it.

However, exception is given to the use of ad hoc tools to carry out such a task, showing that in two thirds of cases guides, work or tasks are used as elements that make it easier to track what has been done. However, the frequency with which such follow-up is done is aimless, with frequencies not defined and in which only a quarter refer to it daily or weekly and, in some cases, monthly; therefore, most do not report precisely what temporary systematicity is established for such a task, considering that it is not foreseen or is not known.

The mechanisms to implement it are based on a communication process where the most common media are used, such as WhatsApp, telephone, social networks and e-mail, so they can be considered as means that guarantee the bidirectionality of information, considering that there are cases where such systems are not available, such as remote rural areas or families with limited resources to access to networks.

In short, besides the restrictive and limiting conditions generated by the pandemic, others

derived from the infrastructures of the school system are added, such as the teacher's own training, the system of management or organization of the curriculum and the diversity of situations to which the curriculum has to be adapted, either because of the students or the diversity of socio-economic and geographical situations of the students and their families, but also because of the institutional dynamics of the schools in which teachers and managers are involved.

5. Limitation and Prospective

The main limitations of the study relate to the number of schools analyzed. In total, 50 schools were analyzed which resulted in a dimensioned sample of the total number of schools participating in the Sumo Primero program. On the other hand, the virtual modality of conducting the interviews, due to the context of the COVID-19 pandemic, limited a greater deepening and approach in the answers to the questions about learning monitoring. From a prospective perspective, the article presents relevant findings on the learning monitoring in public schools located in different regions of the country, which would be interesting to contrast with other schools, with face-to-face procedures for gathering information.

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Interaction, dialogue and pedagogical practices in high school

Interacción, diálogo y prácticas pedagógicas en el bachillerato

Rita de Cássia de Almeida Rezende is a professor at Distrito Federal (Brazil) (ritinhademaria@gmail.com) (<https://orcid.org/0000-0002-3354-7972>)

Dr. Geraldo Caliman is the coordinator of the subject UNESCO de Juventud, Educación y Sociedad en la Universidad Católica de Brasília (Brazil) (caliman@p.ucb.br) (<http://orcid.org/0000-0003-2051-9646>)

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Abstract

Society demands autonomy, dynamism, and protagonist skills in the face of the most diverse challenges arising from globalization that permeates all social sectors. For young people, the school presents itself as a space in which these skills can be better developed since their students are in full cognitive, attitudinal, and socio-emotional training. This research is justified by the need to clarify how the school, especially the teacher, can contribute to the autonomous and dynamic formation of students who study in public schools and reveal themselves to be vulnerable to social challenges. The study aims to analyze the social interaction between teachers and students, focusing on applying pedagogical techniques capable of developing resilience, in a secondary school in a vulnerable community, based on the triangulation of theoretical frameworks of interaction, exclusion, and autonomy. The methodology is based on a qualitative approach of an exploratory nature with the case study method. Data are collected through document analysis, observation, and interviews with eight teachers and twenty students from a public school in the capital of Brazil. As the most relevant research results, it is observed that the teacher-student interaction within the teaching-learning process makes the educational process meaningful for students and pedagogical strategy enables the comprehensive training of students in the face of the challenges that emerge from reality current.

Keywords: Resilience, inclusion, interaction, vulnerability, pedagogical strategies, high school.

Resumen

La sociedad demanda habilidades de autonomía, dinamismo y protagonismo frente a los más diversos desafíos derivados de la globalización que permea todos los sectores sociales. Para los jóvenes, la escuela se presenta como un espacio en el que se pueden desarrollar mejor estas habilidades, ya que su alumnado está en plena formación cognitiva, actitudinal y socioemocional. Esta investigación se justifica por la necesidad de aclarar cómo la escuela, especialmente el profesor, puede contribuir a la formación autónoma y dinámica de alumnos y alumnas que estudian en escuelas públicas y se revelan vulnerables a los desafíos sociales. El estudio tiene como objetivo analizar la interacción social entre profesores y alumnado, centrándose en la aplicación de técnicas pedagógicas capaces de desarrollar la resiliencia, en una escuela secundaria de una comunidad vulnerable, a partir de la triangulación de los marcos teóricos de la interacción, la exclusión y la autonomía. La metodología se basa en un enfoque cualitativo de carácter exploratorio con el método de estudio de caso. Los datos se recogen mediante el análisis de documentos, la observación y las entrevistas con ocho profesores/profesoras y veinte alumnos/alumnas de una escuela pública de la capital de Brasil. Como resultados más relevantes de la investigación, se observa que la interacción profesor-alumno dentro del proceso de enseñanza-aprendizaje hace que el proceso educativo sea significativo para el alumnado y la estrategia pedagógica posibilita la formación integral de alumnos/alumna ante los retos que surgen de la realidad actual.

Descriptores: Resiliencia, inclusión, interacción, vulnerabilidad, estrategias pedagógicas, la escuela secundaria.

1. Introduction

Since its origin, Society has made distinctions among people, classifying them by their physical, psychological and social characteristics. Today, the discourse of respect regarding differences is intensified, with the focus on the pursuit of equality, and according to the Universal Declaration of Human Rights, “all human beings are born free and equal in dignity and rights” (ONU, 2018). In turn, the Brazilian Federal Constitution states in its 5th article that “all are equal before the law, without any distinction” (Brazil, 1988). However, there is a gap between what is said and what is done, and in Brazil, the lack of respect for the various forms of social differences has assumed a historical character, reaching the schools.

Considering the right to equality and dignity for education, which is the focus of this research, it is possible to identify students from a vulnerable community living under hardship, surrounded by family problems, violence, social/educational invisibility, and with difficulties in interacting with teachers. They deal with exclusion that can influence the entire social and educational life.

Despite this challenging context, some students are able to get rid of this situation and free themselves from these cycles. Those who fail to leave suffer directly from the effects of out-of-school discriminatory factors (violence, drugs, discrimination, and social problems), which end up increasing educational exclusion through indiscipline, low grades, failure, and dropout; all this understood as school failure.

To change this scenario, interaction arises as a possible difference between stagnation and overcoming, exclusion and interaction, and dialog to build the resilience needed to face obstacles.

In analyzing the concept of interaction, as far as education is concerned, it can be defined as the relationship of mutual influence in which the behavior of those involved becomes a stimulus for the other (Siveres, 2016; Caliman, 2008). Teacher-student interaction occurs between two

key actors for educational action: teacher and student. This interaction presents these actors as complementary and structured among themselves. One conditions the existence of the other and their actions are mutually oriented.

In short, resilience can be understood as the ability to withstand an unfavorable condition. There is the possibility of developing resilience to different degrees throughout the life of the individual, and it can be developed/stimulated in any social group or institution (Assis et al., 2006).

Looking at Brazilian education, it is observed how it is at a disadvantage compared to other countries: problems such as dropping out of school, the knowledge gap and the social problems that affect the performance of students in school increase. These problems indicate what can be done to reverse this situation, as the world is increasingly globalized with new technologies and it requires new competences. In this rapidly developing world, individuals are required to develop their potential (Luckesi, 2016) to live with these new challenges and overcome them. Resilience (Laplane, 2000), as already mentioned, is a contributing factor to the change of negative paradigms. Resilience, developed and improved through education, can be an essential tool for changing the framework in which Brazilian education is presented. To this end, education is set up as the appropriate place for developing this potential.

Thus, the aim of this paper is to present how teacher-student interaction in a public school in a vulnerable community can change this panorama of failure through the development of resilience in the school environment.

2. Methodology

Research is qualitative and exploratory, using the case study method (Stake, 2016). The population investigated was a public school in Ceilândia, in the Federal District. The school suffers from a major vulnerability related to socio-economic issues, violence, family problems, teenage preg-



nancy, drug addiction and poverty. Students were enrolled in high school on a day shift. Eight teachers and twenty students were interviewed; sixteen classes of Portuguese Language and Mathematics were observed.

The choice of a public school in a vulnerable community is justified because article 206, paragraph VII, of the Federal Constitution (Brazil, 1988) provides for the guarantee of quality standards for education. However, there are differences between the guarantee of this right in relation to vulnerable and non-vulnerable communities. High School was the field of research because it is the last stage of Elementary education, in which students must present themselves as capable of exercising their citizenship and entering the labor market or university (Brazil, 1988).

In the generation of data, deductive and inductive reasoning, the approximation to reality and the bibliographic analysis of theorists addressing the subjects of teacher-pupil interaction, dialog and resilience were used. The research started with a documentary analysis, analyzing the school's Political-Pedagogical Project (PPP), and the course plans of the teachers selected for the research. The objective of this analysis was to identify the possible pedagogical strategies during the teacher-student interaction that contributed to resilience and, consequently, to the inclusion of students from this school. Semi-structured interviews and participant observation were conducted. P will be used for teachers, followed by the number assigned to identify the teachers and students cited in the study. Students will be identified by the letter A followed by a number corresponding to the order of the interviews.

3. Analysis of data and results

The analysis of results was based on teacher-student interaction and how it was presented in the identified topics: the exclusion identified in the research, the pedagogical strategies used by teachers and the dialog constructed through the

interaction observed between the teacher and the student.

In addressing the documentary analysis first, it was based on the Political Pedagogical Project of the Public School of Research-EPP and on the course plans of teachers. The observation was based on a format. However, the relevant information, which was noted throughout the collection, was also inserted in the description presented.

3.1. Circles of Exclusion

EPP students are mostly African-descendants with economic difficulties and major family problems. Therefore, several categories of excluded can be perceived, and they may experience various situations of exclusion (Durkeim, 1999; Weber, 2002). It is observed among the students of this school how they suffer because of poverty, racial belonging, violence and social conditions. In the analyzes, observations and interviews were observed, one composed of students who present some difficulty in learning and the other formed by students with disabilities.

3.1.1. Learning problems

The first circle to deal with is pedagogic. The EPP has unsatisfactory rates of approval in the 1st and 3rd year courses. Observations in the classroom and interviews with the students have shown demotivation toward the study, especially among the students of the 3rd year. This situation can be exemplified by the student A1, who is in the third year and has not decided which career wants to study, has not registered in the Enem, i.e., does not have any plans for the future, and says "... I just want to finish my studies, that's it."

In the course of the 1st year, what stood out most was the recurring complaint about the difference between the 9th Elementary II course and the 1st High school year. It was also critical that the transition from Elementary to High School is not worked with the students of the last



Elementary II courses, nor with the students who have just started 1st grade.

In the EPP Pedagogical Project, there are several references to the concern related to the attention of students with poor performance, with the lack of prior knowledge and necessary for some content, and with students disinterested and absent. EPP guides teachers about students who are absent or have learning difficulties so that differentiated work can be done with them. This inclusive attitude of the EPP allows these excluded students to be accommodated in the classrooms and who need to find feasibility to be included and visualized in the school and later in society.

As a proposal to deal with difficulties/disinterest, EPP suggests pedagogical projects and other activities that aim to contribute to the total development of the student and break this negative circle. Interdisciplinary projects are mentioned in the APP. Some activities encourage participation in tests, such as PAS, Enem, contests, access tests, which apply at the end of the high school, and other activities such as the Mathematics and Astronomy Olympiad.

In High School, which are extra classes distributed to complete the minimum credits required of each teacher, EPP proposes activities to overcome some of the difficulties of the students already identified in the evaluations and/or in the classroom observations. These classes suggest some projects that involve reading and writing workshops, mathematics for students with difficulties, activities in the computer room, and foreign language (Spanish) and mathematics classes.

In the observations made, the work of assisting students with learning difficulties was not as tangible as presented in the PPP. Follow-up classes were not conducted this year, as expected, due to lack of students because most teachers work out-of-school hours. Practices aimed at improving reading and interpretation, difficulties mentioned in the PPP, were observed in the classes of teachers P2 and P5, who work

with transdisciplinary projects based on subjects of the daily lives of students.

Regarding learning problems in the area of mathematics, two more significant actions were observed: Follow-up by the Library teacher to assist students who request it; and the interventions that Professor P1 performs in the classroom focused on prerequisite activities, i.e., necessary and previous content focused on mathematical concepts with the aim of contributing to the progressive recovery of knowledge in this area.

In interviews with teachers, the perception of attention to the students' difficulties was quite different. Four of the interviewees point to the lack of interest of most students, discouraging pedagogical work. They feel the need and obligation to contribute to reducing the perceived difficulties in classes and assessments. For teachers, students show little interest in repairing prerequisites or for example working out difficulties in reading or interpreting. According to the four teachers, the greatest concern perceived among the students was to obtain the minimum grade required to pass. This attitude was more common in the 1st year. In the 3rd year, a more significant concern with the studies could be found because of the Enem and the university entrance exams. It is also noted that some students are exclusively interested in passing the exam with a minimum grade.

In their interviews, the students stated that participants in the reading and interpretation motivation projects performed better during the semester than students who did not participate and who became more interested in the classes and effectively participated in the proposed activities.

3.1.2. *Special Students*

In the school's PPP, the inclusion of students with disabilities is covered by goal 4 of the National Education Plan-PNE (Brazil, 2014). For students with disabilities, EPP offers special-



ized educational assistance-AEE.¹ The Resource Classroom² is responsible for ensuring student participation in the regular classroom, guiding and controlling the application of small or large curricular adaptations (Góes & Laplane, 2004), being implemented by teachers to provide better learning for these students.

In the regular classroom, a more significant interaction between teachers and these students was observed. There were also activities that tried to show, in different ways, the content so that they had better learning conditions. The interaction of teachers with their students is different, and these students are encouraged to participate in class. Students also participate in mixed group activities within the classroom where they are evaluated.

In interviews with the two teachers working with students with disabilities, they mentioned the concern to better meet the specific needs of this group. Teachers believe that much remains to be done to develop and include in these students. They confirm that there was an improvement among some students who can now participate more effectively in the pedagogical activities, present group work, take exams in standardized rooms and socialize during the breaks.

In the interview with the two students with disabilities, the enthusiasm they express for studying is noticed. They spend more time in the EPP than the rest of the students because they need to attend the Resource Room some days in the morning, in addition to every afternoon in the regular classroom.

Thus, the EPP serves both students with learning problems and exceptional students, representing the two exclusion circles identified in the investigation. However, through interviews and observations, it was seen that the circle of special students has more interaction by the whole EPP. It may be because they have the legislation that orders activities that meet their needs.

3.2. Pedagogical strategies

“Pedagogical strategies” are understood here as the procedures planned and implemented by educators to contribute to the learning of their students. They must be diversified and creative in order to meet the different contents and needs of the students attending the classroom (Antunes, 2015). In an overview, the pedagogical practices that most contribute to the training of students are similar to the concept of active methodologies (Revans, 2011). They conceive students as agents and protagonists of their learning, and some of the plans presented used active methodologies.

Thus, both in the PPP and in the guidelines for the development of the course plan, it is evident that the school considers that the way of teaching has to be innovative, effective and diverse. It makes it clear that strategies are needed to contribute to the cognitive and behavioral training of the student. In analyzing the course plans presented by EPP teachers, it is essential to note that, despite the many pedagogical strategies that can help them in the classroom, the most mentioned in the plans were the traditional ones (reading, debate and conference).

The first course plan analyzed was Mathematics. It has as strategies presentations and participative class, the formation of teams to solve exercises, extra-class research activities and the observation and participation of students in terms of attitude. Presentation and participatory class are strategies that can contribute to the development of resilience because, in addition to the interpretation and discussion of the contents presented in the class, the student can develop the capacity to dialog and create empathy. This strategy allows the student to develop the skills of dialoguing, reflecting and evaluating the context.

The second strategy aims to solve problems through operational games. They are aimed at promoting reflection, the search for solutions, dialog, collaborative participation and the



analysis of possibilities (Koehler et al., 2010). Professor P1 teaches the class with a presentation, with interaction and encouragement of student participation in general. To explain the content of the class, the teacher performs activities with meaningful examples based on the reality of the community and with concrete elements. The teacher emphasizes that these activities are necessary to facilitate understanding and learning; all exercises are solved with the participation and input of the students. They all stay near the teacher and pay attention to everything he/she says.

During the third year of Portuguese language, strategies and research are included in the four bimonthly areas and are targeted to research. Both pedagogical practices help the reflective, critical and autonomous development of students. In addition to these strategies, literary workshops promote the development of creativity. The 3rd year planning also includes a practice called feedback that helps develop critical thinking, acceptance, and respect. The rewriting of essays/texts helps the development of these competences. The planning of the first year of Portuguese Language includes activities such as field trips, which favor the development of group learning, observation, concentration and play, which develop creativity, reflection and understanding of the world (Koehler et al., 2010).

The observation of the first year in the classroom results from a divergence between what is planned and the practice. Professors P3 and P4 did not use the diversified pedagogical strategies included in the planning. The classes were only about presentations and without motivations for student participation, which contributed to their lack of concentration.

Some teachers work on reading and interpreting difficulties through transdisciplinary projects. In the first semester, the outstanding project was carried out by P2 and P5, teachers of the 3rd year. The activities were based on the Maria da Penha Law (Brazil, 2006) and were carried out through discussions, text production,

interviews, seminars, essays and preparation of videos. All of these are pedagogical strategies, as Antunes (2013) said, which significantly help the student's learning. Student participation was visible, and activities were worked in the classroom, at home, and as evaluative activities. The videos made by students were recorded in the "Mostra de Curta de Brasilia", 2019, resulting in the first place, checking their improvement in the pedagogical field and in the promotion of citizenship. This satisfaction can be confirmed in the A2 student speech, who expresses the pride in the "[...] result of our work" and A6 who says how "great it was to work in class on topics common to our community and us."

To work on social and emotional competencies, we look at the school teachers' project P2 and P5, which addresses the multidimensional training of students. The project aims at citizen training and the development of empathy for students. The work brings results with the change of behavior, citizen awareness and participation in the student's reality inside and outside school, because it works respect, empathy and life in society.

Another excellent project for the integral training of students, also performed by teachers P2 and P5, focused on the value of women in the family. This is presented as relevant because the school PPP records that women (grandmothers and mothers) support most of the families in the community. The work generated respect, admiration and a change in student behavior toward the lives of these women. In addition to the practices aimed at dialog, through the development of the production of texts, debates and exhibitions at the school, it is observed that there was a development in the attitudes of students toward otherness in the family. The students mention that they like classes that have to do with their reality (Wallon, 1968), which are made possible through practical activities and not only unpractical content.

Regarding teachers, all agree to contribute with pedagogical strategies to the integral train-



ing of the student. However, four teachers believe that students are not committed as they should to the proposed activities. Would not a lack of commitment be a lack of relationship between the proposed activities and the reality experienced by the students?

3.3. Dialog

Dialog is the basis for communication, and the need for a dialogic relationship between student and teacher is unquestionable for the interaction. Therefore, the teacher can positively influence through the polysemic and ontological dialog because his/her proximity to the students allows to know and interact effectively with the pedagogical process.

Thus, dialog is seen as a relational process that influences personal, epistemic and ontological relationships. The human being is a social being who talks with himself, with the other, with culture and with nature. Therefore, in school, dialog must be intentional because, through it, there is the possibility of personal realization and social transformation, according to Freire's pedagogy.

Freire (1992) and Siveres (2016), said it is possible to verify the effectiveness of the dialog between teachers and students, and it was witnessed at two different times in the EPP. In Professor P1's class, the conversation is spontaneous and enjoyable, attentive to classroom feedback, and motivates students to participate in all activities. In Professor P2's classes, the conversation starts in the halls of the school until it reaches the content proposed for the day. Each time a link appears to the life or reality of students (neighborhood violence, public policies, and social context), this link is inserted immediately into the classroom context so that everyone can also discuss it.

In the classroom observations, we note the difference between classes with motivating, inspirational, and dialogic pedagogical practices

and classes of "chalk and chalkboard" with only "teacher's monologue".

The observations reveal that the practices in some classrooms contradict reality. While in some classes dialog is natural and spontaneous; in others, there is teacher's monologue. Although the conversation is apparently constant in the classroom, the dialog is limited to students and groups formed in the classroom. Most teachers seem to only establish dialogic practices when they demand silence and attention or remind students that a specific activity deserves a grade.

Classes without interaction and dialog are disassociated from students, generating dispersion and apathy (Moreira, 2010). Students were present in the classroom, but without effective participation, and when the bell sounded to finish the class, they left rapidly. The teacher presented the content and repeated this behavior in the next class.

Three of the eight teachers interviewed began to assist the students in the EPP corridors and those who had already entered the classroom, having a receptive conversation about how the students are doing and the pedagogical work. Classes with pedagogical strategies were filled with dialog, discussions, debates and empathy. The participation of the students was significant, so that during the class the respect, conversation and the presentation of similar or opposite opinions were presented.

Fifteen of the twenty students interviewed also mentioned that the way the teacher speaks and interacts with them makes a great difference. This relationship, positive or negative, is seen in the level of student participation in activities and how motivated or not they are to present their ideas during the class or in the proposed activities (Assis et al., 2008).

This difference in teachers' use of dialog is noted in interviews with students and is exemplified in student statements: A7 - "There are teachers who do not talk to us. Some teachers do not treat us in a polite way" - and A2 - "There are teachers who are our friends".



4. Discussion and conclusion

Interaction is the reciprocal relationship of encouragement and influence among people. Interaction is present in the teacher-student relationship in the school and is a necessary tool for the construction of the entire pedagogical process. In the research, the interaction was classified according to pedagogical strategies and dialog, and these two aspects were recurrent or absent. These two categories are essential for positive interaction to help students learn and develop fully, and for the dialog to occur in the classroom, which is an indispensable tool for the pedagogical and social process. Thus, the absence of strategies and dialog have a negative impact on the entire educational process; the opposite is also true, since strategies and dialog have a positive influence on that process.

It is necessary to build and prioritize the interactive process between teacher-student in the school. As Wallon (1968) points out, the school is a significant resource for the development, since, from the early years of school life, it becomes the center of the relationships that guide the cognitive, interactive and affective development of the student. In this way, the environments form the individual, and the school is one of those environments.

According to Tavares (2002), resilience is linked to individual skills and can be built through interaction with people and their context. Thus, as far as teachers and observations are concerned, it is possible to state that the development of resilience in some students was achieved through the attitude of some teachers who were concerned with developing strategies to favor the solution of practical exercises, pedagogical and advisory practices aimed at the continuity of studies. This behavior reinforces the role of the school and teachers because both are promoters of resilience and can positively influence individual self-reliance, self-control and character formation (Caliman, 2012).

Teachers also considered the interaction between teacher and student to be positive. However, some teachers remain distant from the students, entering the classroom only to teach contents and present their teacher-centered classes, paying little attention to relationships in the classroom.

A school that promotes dialog (Buber, 2003), which welcomes and creates confidence and autonomy, contributes to the construction or development of resilience in students (Assis et al., 2006). Building or developing resilience breaks the link with a pessimistic culture that tends to be consolidated within the educational process. This culture is based on the lack of interest of students, the lack of commitment of teachers, drug addiction increasingly present in schools and social and domestic violence, leading students from vulnerable communities to inevitable school and life failure.

All students need opportunities to promote meaningful and diverse learning, and those living in vulnerable communities even need more encouragement to learn, so that they can break the exclusion processes that harass them and configure new life prospects. Teixeira (2016) has four pillars of resilience, humor, creativity, optimism and motivation. These pillars can be seen in the projects carried out by the EPP to promote the development of creativity and optimism and to motivate students to change in the face of the reality they live.

The observations show how the student does not do what is proposed because he/she does not know how to do it, and this is also explained by the training gap (between the age of the student and the class he/she attends) that is accumulated, affecting the academic formation of students from Elementary School. When the student reaches High School, the idea is that everything depends on him/her, and he/she ends up being responsible for building his/her own knowledge. Many times, the attitude of the student with a formative gap may be seen as



disinterest and apathy, resulting in some cases in school drop-out and recurrent repetition.

If the formation of the high school student was based on what Marandino and Scarpa (2017) say, this educational stage should be the space for information and knowledge to be based on reflection, having the training of the student in its entirety. For this to happen, the student must be part of the entire pedagogical process, contributing with his/her ontological and epistemological perspective, developing the power to understand the world and, consequently, developing resilience to the challenges of school and society. Everything must be done between the school and the student, as Don Bosco (Hornich & Biscalchin, 2018) already stated in his work with the youth.

Developing a vision of comprehensive training is essential and is reaffirmed through the school's success in building a resilient culture, where the development of competencies favors inclusion inside and outside the school. A culture formed from the performance of the educational institution, through its educators, aimed at influencing the life history of each student. In this way, it is possible to eliminate the negative stigma that the school promotes exclusion, as has been presented.

In this regard, teacher training should be based on other areas than cognitive. It must present positive pedagogical strategies and promote interaction in the classroom. Thus, the school can become an environment conducive to the integral formation of high school students, creating possibilities to change from the culture of failure to a culture of inclusion of resilience.

The path to making High school a period of concrete learning and integral training of the student must be gradual but constant. This change certainly requires educational policies that value education in general and require teacher participation. The teacher must be willing to change the educational paradigm that has been created and consolidated in recent centuries. The teacher should be encouraged to develop an

awareness of his/her responsibility in promoting student learning. To do this, it is necessary to provide opportunities for continuing education (Imbernón, 2010). The teacher must have access to training to use new pedagogical strategies, such as active methodologies (Revans, 2011), to be valued as a citizen and professional, aware of the determining role in the performance of students.

Notes

- 1 Mandatory attendance guaranteed by Decree No. 6.571/08 and Ordinance No. 243 of 15 April 2016.
- 2 Physical space guaranteed by law (Resolution SE 68, of 12-12-2017).

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Motivational study on learning religion in Basic Education using ICT

Estudio motivacional sobre el aprendizaje de la religión en Educación Básica mediante las TIC

Justo Olivares-Rosado works at the Archdiocese of Quito (Ecuador) (justo@arquidiocesisdequito.com.ec) (<https://orcid.org/0000-0003-1347-9025>)

Dra. Isabel López-Cobo is a professor at Universidad de Sevilla (Spain) (ilopez10@us.es) (<https://orcid.org/0000-0003-3579-0877>)

Dr. Jesús Conde-Jiménez is a professor at Universidad de Sevilla (Spain) (jconde6@us.es) (<https://orcid.org/0000-0002-4471-5089>)

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Abstract

Motivation is an aspect that serves as a motor to awaken interest in assimilating a particular curricular unit. This research aims to determine the causes that cause demotivation in the students of Basic General Education (EGB) of a model religious educational institution and its influence on the interest in learning about religion, in order to incorporate ICT as a motivational teaching strategy. Methodologically, it is an investigation under the positivist paradigm of a non-experimental, ex post facto and transversal nature, of a descriptive and causal nature, with a documentary and field design. The type and depth level of the study is descriptive and explanatory-correlational with the participation of a sample of 268 students and eight religion teachers. Two types of questionnaires were designed, one aimed at students and the other at teachers. The hypothesis consisted in verifying if greater motivation and satisfaction of the students, greater learning of religion in Basic Education. The results show the presence of a low level of motivation and satisfaction in the student body due to deficiencies in the learning environment, as well as the use of traditional teaching methodologies that limit the active participation of the student. The need to apply alternative methodologies that incorporate ICT to increase student motivation and, therefore, academic performance is highlighted.

Keywords: Religion, education, technology, information, communication, motivation.

Resumen

La motivación es un aspecto que sirve de motor para despertar el interés en asimilar una unidad curricular en particular. Esta investigación tiene como objetivo determinar las causas que provocan desmotivación en el estudiantado de Educación General Básica (EGB) de una institución educativa religiosa modelo y su influencia en el interés por aprender sobre religión, con el fin de incorporar las TIC como estrategia motivacional de enseñanza. Metodológicamente, se trata de una investigación bajo el paradigma positivista de carácter no experimental, ex post facto y transversal, de naturaleza descriptiva y causal, con un diseño documental y de campo. El tipo y nivel de profundidad del estudio es descriptivo y explicativo-correlacional con la participación de una muestra de 268 estudiantes y ocho docentes de religión. Se diseñaron dos tipos de cuestionarios, uno dirigido al estudiantado y otro a los/as docentes. La hipótesis consistió en verificar si a mayor motivación y satisfacción del estudiantado, mayor aprendizaje de la religión en Educación Básica. Los resultados evidencian la presencia de un bajo nivel de motivación y satisfacción en el estudiantado a causa de deficiencias en el ambiente de aprendizaje, así como al uso de metodologías de enseñanza tradicionales que limitan la participación activa del estudiantado. Se resalta la necesidad de aplicar metodologías alternativas que incorpore las TIC para incrementar la motivación estudiantil, y, por ende, el rendimiento académico.

Descriptores: Religión, educación, tecnología, información, comunicación, motivación.

1. Introduction and state-of-the-art

According to Arévalo-Tapia (2016), there is evidence in Ecuador of a poor motivation of students regarding their desire to learn the subject of religion, even more so in Catholic educational institutions whose subject is a compulsory part of its academic program, although for the State it becomes an optional subject. In this regard, Núñez-Soler and Lourdes-González (2017) consider that lack of motivation and disinterest lead to poor academic results, so it is appropriate to know the causes that provoke it and the impact on learning. Holmes-Coto (2018) highlights that Ecuador is currently undergoing a process of change, curriculum updates, evaluations of educational institutions and ongoing training of teachers; however, there are still some shortcomings in the teaching-learning process due to traditionalism in teaching, where the student does not have significant learning.

Therefore, the aim of the research is to determine the causes that provoke demotivation in Elementary School (GBS) students of a model religious educational institution and its influence on the interest in learning about religion. In order to incorporate Information and Communication Technologies (ICT) as a motivational teaching strategy.

1.1. Religion in Ecuador

Following a study conducted by the National Institute of Statistics and Census in 2012, it is reported that 91.95% of the population in Ecuador claim to have a religion, of which 80.4 % correspond to people practicing Catholicism (Ecuador en cifras, 2012), therefore, research is relevant when analyzing what is pedagogically preventing students from having an interest in learning religion and how the situation could be improved.

Additionally, Salinas (2016) points out that Catholic educational institutions have a high acceptance by parents who want an integral edu-

cation for their kids that is not only constituted through a high-level formal education, rather, their personal education shows the development of a set of values and a well-defined moral awareness. At present, it is noted that these institutions have not internalized the importance of religion in the student. Hence, the research will show the causes of such an event and the possible solutions to increase motivation in students.

Considering that the causes are methodological in the teaching of the School Religion (ERE) and teacher-student relations, Salinas (2016, p. 594) states that “we need to study further the subject of the contents and methods of religious education within the possibilities offered by the school framework, so that it can develop as a school subject with all its consequences”, in other words, the existence of disadvantages in the teaching process that interferes with meaningful learning, and thus with the school motivation for the purpose of assimilating religious education in order to foster values in the personality of the learner has been predicted.

1.2. Learning as a process to assimilate the school religion

There are different paradigms that focus learning differently depending on the premise that is defended; in this regard, it is noted that throughout educational history and evolution, the behavioral and constructivist paradigm have appeared and remain in force. These are described below:

1.2.1. Behavioral Paradigm

Its predecessor, John Broadus Watson (1878-1958), was the creator of the behavioral school, considering that psychology should be responsible for the study of observable processes of human behavior; with this definition on the subject of psychology, he placed it in the positivist current and excluded everything that was not



observable, measurable and verifiable (Morales-López & Irigoyen-Coria, 2016).

During his stage as an assistant professor, he was influenced by Ivan Pavlov in which he agrees that neither the mind nor the conscience can receive a purely objective treatment (Garello, 2019). Regarding the contributions that behaviorism provides to pedagogy, Salas (2002) notes that “the purpose of behaviorism is to shape behavior through intentional manipulation of the environment” (p. 3). It also expresses that, under the behavioral paradigm, the teaching methodology is framed in the establishment of objectives whose results can be measurable by showing a quantitative approach with progressive development in the academic performance of the student. On the other hand, Sánchez (2012) confirms that “the pedagogy in the theory of behavioral learning focuses on a didactic that supports the behavior of the student, using the design of the curriculum by objectives and where the quantitative evaluation of academic performance predominates” (p. 74).

At the time, he made great contributions to the educational process; however, later failures and criticisms of his teaching results and methods began to be found. For example, Burrus Frederick Skinner, who also declared himself as a behaviorist, made other contributions in which he pointed out that traditional teaching was covered by a cluster of deficiencies that hampered the student’s learning process (González, 2004).

1.2.2. *Constructivist paradigm*

Mainly, it is based on Jean Piaget’s ideas regarding cognitive progress in learning. This author focused on two main aspects, the first related to the development of thought in being; and the second to the morphological development he experiences. It focused on biological models by extrapolating it to the above-mentioned disciplines, applying it to the development of the intellect and to the psychology of the students (Saldarriaga et al., 2016).

The problem of constructivism is the construction of knowledge. Its epistemological foundations are constructivism, interactionism and relativism; constructivism because it comes from the assumption that the subject is active in the environment, taking from it the elements that are significant to him; interactionism, because the subject interacts with his environment in order to solve the problems that are presented to him, and relativism because it depends on the environment and the needs of the subject; the processes of knowledge are developed, generating specific results, for specific situations (Morales-López & Irigoyen-Coria, 2016).

According to Regader (2020), Jean Piaget was involved in the psychological development of information and in the constructivist theory approach of intelligence development, established by authors such as Lev Vygotsky or David Ausubel, to create Piaget’s Theory of Learning, in which he explains that a reorganization of the cognitive structures that exist at each moment must be carried out in the learning process; from new experiences and qualitative jumps the learner internalizes new knowledge.

From the pedagogical perspective, constructivism has generated many expectations in education and with great contributions and results; in fact, it is considered one of the most recognized by general psychology (Navarrete et al., 2020).

In this sense, Piaget shows that each student (subject) is able to build his own cognitive process (scheme) according to his way of thinking and knowing, as a result of interaction with the environment (objects of reality). In this way, he incorporates the adaptive nature of intelligence from two key concepts of his theory that are binding, assimilation and accommodation, seeking to balance the subject with objects (Piaget, 2009). With regard to assimilation, Piaget conceptualizes it as that “action of the organism on the objects that surround it, whereas this action depends on previous behaviors referring to the same objects or other analogues” (Piaget, 2009, p. 18).



Piaget (2009) demonstrates the active (rather than passive) character the being has to assimilate, adapt and respond to the facts that arise in the environment.

However, another of the outstanding precursors in the constructivist paradigm is Lev Vygotsky, who based his contributions to the socio-cognitive development in the early childhood of the person; the appearance of language and communication; the construction of written language; and other learning-related aspects (Carrera & Mazzarella, 2001). In his works, Vygotsky presents two main concepts in his proposal, which are related to instruments and symbols as a means of understanding social processes; here, symbols or signs are understood as those instruments that serve as mediators for the development of behavior. There are conceptual differences between Piaget and Vygotsky; Piaget observes the signs from a semiotic functional vision; Vygotsky perceives it as a semiotic mediation (Vergel, 2014).

Regarding the research, it is observed that motivation represents symbology; while teaching methodology represents the instrument by which the social changes that arise in the classroom and outside it can be provoked and understood, seeking meaningful learning of the subject of religion.

For this reason, Vygotsky's theories focus on thought, language, memory and games in educational processes and student mental development (Atlantic International University, 2008). By virtue of the social conceptions that Lev Vygotsky attributes to the education process, the approach of social constructivism is established, where the person is considered as the result of a historical and social process, and language plays a relevant role in his cognitive development, stating that knowledge is based on the interaction process of the person with the environment, emphasizing social and cultural aspects, and not just physical aspects (Payer, 2005). In other words, Lev Vygotsky emphasizes the importance of social and cultural factors in the appropria-

tion of knowledge, and especially in the development of the different mental activities of the student, and that they can be assimilated on their own or with the help of another person (Bolaños et al., 2011).

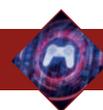
Finally, establishing similarities between Piaget and Vygotsky, both agree on opposing associative or exclusively to experimental learning (Severo, 2012), by including the concept of meaningful learning as a way to assimilate by activating previous experiences and knowledge with which the new knowledge relates and integrates into a process that involves meanings or understanding of knowledge (Rivas, 2015).

The theory of meaningful learning was a contribution to the educational field presented in 1963 by David Paul Ausubel (1918-2008), at a historical time when the behavioral current was prevalent. In this regard, he proposed as an alternative "a discovery-based teaching-learning model, which favored activism and postulated learning discovered" (Rodríguez, 2011, p. 30)

Given its proposal, it offered it as an ideal form of human learning, which allows assimilating knowledge and remains in time, i.e., the so-called significant receptive with application in the classroom and in daily basis (Ausubel, 2002).

According to Rodríguez (2011), the significant learning process is an essential axis in teaching, where the same student has an active participation by assimilating and retaining the information and content taught through the assimilation of concepts according to the knowledge and experiences that make up their cognitive structure, allowing them to learn in a non-arbitrary and significant way. In short, it is based on the condition that the students learn, based on the importance and significance of the content, and on what they already know.

To conclude, the use of learning theory allows to search for and show the conditions and properties for assimilation, which relate to effective ways of reflexive cognitive modifications with stability and are prone to offer a meaning of its own from the environment.



1.3. Motivation as an engine of interest in the meaningful learning of the school religion

Valenzuela et al. (2014) say that motivation results from the expectations that the student has on successfully carry out the works assigned by teachers and the value of importance, usefulness and interest that he gives them; involving the student into an emotion that is worth the effort to carry out that activity and learn. García (2014) assures that motivation refers to a specific need or desire that activates the organism and directs the behavior to the objective or goal.

On the other hand, according to Valenzuela et al. (2015), motivation is a force that encourages the student to do homework that the teacher assigns as a learning reinforcement about the curricular contents, but this does not mean that it ends with the completion of the task.

Kazarián (2017) considers that motivation is the set of various psychic factors that guide people's behavior related to a need; it is directed, intense and sustained. Therefore, motivation can be understood as an impulse due to a need for a person to start or stop a process during which a goal is set, essential resources are used and a certain behavior is maintained due to an internal state that activates, directs and maintains it with the aim of achieving a goal.

In this sense, it can be said that there is a close relationship between motivation and performance; therefore, "as motivation is a dynamic variable, it is subjected to changes in the intensity of its relationship with performance when it interacts with certain conditions and stimuli of the environment" (Rivera, 2014, q. 27).

Consequently, as García and Betoret (2000) mention, teachers are essential for the motivational process of students to achieve quality in the teaching-learning process, and as such, they can take advantage of a set of indicators to measure motivation as mentioned by Del Campo (2017), serving as a tool for observing whether students are actually motivated or not in

the learning process. These indicators are: quickness of response; perseverance; selection among the various and possible ways of doing the work assigned; intensity with which the student performs the work; and reflection of the emotion shown in the face or body when doing the work.

According to the literature, there are two types of motivation, intrinsic and extrinsic, which are discussed below.

1.3.1. *Intrinsic motivation*

According to Rivera (2014), intrinsic motivation occurs when the source of motivation lies in the individual and the task; in other words, there is motivation without the need for extrinsic reward, i.e., the student does not depend on other external factors or circumstances, but just studies because he likes it; in this case, it becomes solid learning, since it improves student performance. This type of motivation affects the self-determination of the student; these are some of the characteristics common to the student who are intrinsically motivated: (A) they do their work on their own initiative; b) they investigate something more than what was taught in class; c) they learn things in a reasoned way and not by heart; (d) they do not give up in the face of failure; and, e) they are enthusiastic about finding the results and having a high performance.

In short, in order for students to be motivated and obtain good academic results, they must necessarily have their own will to continue researching, this means that they act with curiosity, competence and self-determination, resulting in positive emotions such as satisfaction. It is very common that the human being is constantly striving to understand and assimilate his environment, allowing to survive the constant changes faced daily.

1.3.2. *Extrinsic Motivation*

Extrinsic motivation occurs when incentives and sanctions are required to perform actions or tasks, i.e., the student depends on external



factors to carry out his or her learning. This type of motivation has been used throughout history, but the expected stimulus is not always achieved, so there is the opposite effect, the discouragement.

In this context, in order to avoid demotivation in the student, a set of actions should be generated in which Ibáñez (2016) suggests: (A) to avoid negative comments in the attempts to participate; (b) to avoid conducting the teaching activity with excessive authority; (c) to incorporate collaborative work into planning; (d) to value positively the attempts to learn from the student; (e) to highlight successes rather than failures; (f) to know the causes of success or failure; (g) teaching must be relevant and related to the real life of the student; (h) content must be clear and affordable to the student's ability; (i) be attentive to low-level motivational manifestations; (j) to encourage participation with decision-making; and, (k) to implement alternative methodology that includes topics and resources of impact during the class, avoiding extreme situations of maximum anxiety or boredom, such as ICT.

1.4. ICTs as a motivational resource for meaningful learning of the school religion

Several authors have addressed information and communication technologies from different areas, including Aznar-Díaz et al. (2018) with virtual reality and Cabero-Almenara & Valencia-Ortiz (2019) with inclusion.

However, in order to conceptualize ICT as a discipline associated with computer science, it is understood as a means of communication mediated by information and communication technologies that generate innovation in education processes, work and interpersonal relationships (Moreno-López et al., 2017).

Maldonado-Berea et al. (2019) consider that (ICT) intervene directly in the culture of a country as a moderating agent and influence national identities, because they modify

interpersonal relationships, the production of meaning, cultural identification, ethics and every sphere of human life. Their access requires the participation of citizens (...) to strengthen education services.

Because of the latter, the teacher has a fundamental role in promoting and motivating the best use of these to promote teaching-learning in a significant way; in the case of this research, it is aimed at the studies of religion in the students of the GBS. Regarding the importance of ICT, Arévalo-Tapia (2016), Vallejos-Briceño (2017) and Goor-Ramirez et al. (2019) agree.

2. Methodology

Research has been developed under the positivist paradigm of a non-experimental, *ex post facto* and transverse character, descriptive and causal nature, in which what happens in the natural state is observed and analyzed. A cross-sectional design is used as data is collected in more than one group at a time through surveys conducted and submitted using a technology platform called SurveyMonkey, in which a series of variables are investigated that aim to measure and discover the negative causes that influence the motivation of the student in the virtual sessions of the subject of religion.

The design of the research is documentary and field. First, studies developed by other researchers are used through a process of collecting, selecting, analyzing, criticizing and interpreting them. On the other hand, according to Arias (2012), it is considered field research, since the study subjects are treated using data collection in order to know and interpret the behavior of the study categories and their relationships without manipulating the variables or context.

However, regarding the type and level of depth of the study, it is descriptive and explanatory-correlational; first, because it seeks to characterize the behavior of the categories of analysis as reported by the study subjects, and, second, the aim is to explain the reasons for the



causes and effects by means of a hypothesis test with a correlational study in order to achieve a sufficiently deep level that shows the results and conclusions that determine the behavior of the categories of analysis and the subjects of study (Arias, 2012).

In relation to the population, the eight religious teachers are included, representing 100% and 876 students from EGB between the 8th grade and the 3rd year of High school from a model institution in the city of Quito, in the school year 2020-2021. The selection of the sample was made according to the formula for finite populations, since the number of students who study at the model institution for the selected grades and years is known, obtaining a sample of 268 students with 95% confidence, a sample error of 5% and an expected proportion of 50%. While, in the case of teachers, the census is applied since the eight professors selected are surveyed.

The questionnaires submitted by Moos et al. (1995), were considered as the basis for data collection tools, for which it was necessary to make adjustments to address the questions to the field of religion, in order to describe and understand the causes-effects that affect motivation in the student. Based on the instrument proposed by Moos et al. (1995), two questionnaires were adapted for students and teachers, which include aspects related to:

- Personal and social factors (age, gender, course, family and cultural social environment).
- Academic factors (teacher-student relationship, teaching method, school environment).
- Level of student motivation.
- Social demographic data of the teacher.
- Level of use of technology according to student and teacher.
- Level of readiness of the student and teacher in the use of technology.

- Level of satisfaction and motivation of students in learning and teachers in teaching.

In fact, a questionnaire was designed for the student and another for teachers, and both were submitted to construct validation by factorial analysis using the IBM® SPSS® statistical package version 24. To do this, the main component extraction method was applied to generate the correlation matrix for each of the established categories. In this way, those factors with values higher than 1 were extracted. Descriptive statistics are used; the arithmetic mean (\bar{x}) was used as a measure of central tendency to know the impact of the learning environment and the teaching method of the subject of religion on the motivation of the student; level of motivation and satisfaction of the student in learning.

A correlational analysis, using Spearman's Rho coefficient is also shown for each of the analysis categories.

To develop the above, the hypothesis is that the greater motivation and satisfaction of the student, the greater the learning of religion in Elementary School.

In this sense, it is proposed as an alternative hypothesis (H1) to verify whether there is a relationship between the motivation of the student and his satisfaction with the teaching methodology of the subject of religion, and as a null hypothesis (H0) the non-existence of a relationship between the motivation of the student and his satisfaction with the teaching methodology of the subject of religion.

3. Results

From the data collected in the research process, it was noted that:

- Positive and negative results that influence the student's motivation, with average values higher than 3.50, include:
 - They feel like important members of the group.



- They work together in virtual applications.
- Sometimes they are blamed by the teacher.
- The outstanding student is given more attention and motivation.
- Related to the teaching method employed by teachers and identified by the student in the formation process of religion, the development of skills in students has an average of 4.36 and the use of the traditional methodology of content dictation 4.27.
- In relation to aspects related to mood, concentration; participation; desire to be a better student; freedom of expression; among others, it should be noted that few items show a high level of motivation; on the contrary, the averages tend to 1 which represents the category of strongly disagree or somewhat disagree.
- The level of satisfaction that students report in terms of the enjoyment of learning religion shows that the average values above 4 are considered not fun to receive religion classes and to be bored, only the average or average value of 1.99 enjoy religion classes.
- 66.4% of the students say that the use of technological tools in the subject of religion is important or very important; one quarter is indifferent and 5.6% gives little importance to its use.
- 75% of teachers consider the use of technological tools important in the subject of religion and 25% do not care.

4. Discussion and conclusions

According to the results obtained from the central trend analysis with the use of the mean with the learning environment variable, the data indicate that this variable effectively influences the student's motivation, noting that most items point to the somewhat agreed category and totally agreed. Likewise, as for the variable teach-

ing method most of the students say that the average aims to ensure that teachers are in the search to develop a set of skills and abilities that allow them to be applied in the virtual sessions. However, they also identify almost entirely that teachers do not allow active participation of the student, since they are dedicated to present content of the subject, this is confirmed by teachers when they point out that they use the traditional method of master classes and content dictation; likewise, the positive aspects of education that promote an active-participatory approach tend to 1, i.e., little disagree and totally disagree. Therefore, another type of teaching methodology must be established to motivate the student to learn religion. Criteria to which Zaninelli (2019) agrees when considering necessary for teachers to employ strategies of different organizational methodologies to achieve motivation of the student (...).

Regarding the motivation category, it should be noted that few items show a high motivation level; on the contrary, the averages tend to 1, representing the scale of strongly disagree or somewhat disagree. In view of this fact, the situations with the most motivational disadvantages refer to the absence of help and support among students to understand religion. Similarly, there is no motivation in the student to actively participate or to have an interest in relating to teachers or to each other in the training process and they do not feel free to give their opinion and participate in the virtual sessions.

Related to this, Kazarian (2017) highlights the role that motivation plays in the student's learning process, where the role of the teacher is important in the selection of tasks and activities that offer challenges to intelligence, the imagination and the communicative needs of the student, and provide the enjoyment of the learning process.

As for the correlational analysis through the Spearman Rho coefficient, since the p value is higher than 0.05 for each of the analysis categories it is concluded that the alternative hypoth-



esis is accepted, in other words, it is confirmed that there is an association between each of the research variables, particularly between motivation and teaching methodology.

In short, the results obtained from the student show that there is indeed a high demotivation level for learning religion, since students experience disinterest; boredom; apathy; upset and feel they waste time because they do not find a sense of personal or spiritual benefit. Also, there are some negative aspects regarding the behavior of the teacher and the way of teaching the subject by leaning toward exclusion behaviors between the student and differentiation with clearly demonstrated preferences. Finally, there is willingness by students to use ICT in the teaching-learning process given the perceived importance, including as a motivational means to attract attention and dedication to the subject of religion, a criterion that is reaffirmed in research (Vallejos-Briceno, 2017; Flores-Cuevas, 2018).

From the analysis, it can be summarized that:

- Teachers favor the existence of student demotivation in the learning of religion with the teaching environment, given the presence of behaviors that cause disadvantages in the teacher-student relationship.
- The traditional teaching methodology applied by teachers does not promote the active participation of students by causing passivity and disinterest in learning the subject.
- Apart from the fact that teachers are very motivated with their professional career in the field of education, it is necessary to extend this motivation to the student with different methodological activities and strategies and an inclusive behavior of the student.
- The results obtained confirm and justify the research carried out, since the aim is to address with optimal solutions the factors that affect the demotivation of the students

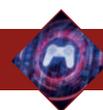
for learning religion in the GBS. To this end, the need to apply alternative methodologies that incorporate ICT to increase student motivation, and thus academic performance is concluded, which allows to expand possibilities to extend the line of research in aspects related to learning environments and teaching methods to motivate students.

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Visual fixations and characters: incidence in the understanding of expository texts

Fijaciones visuales y caracteres: incidencias en la comprensión de textos expositivos

Dr. Rodolfo Antonio Padilla-Berdugo is a professor at Institución Educativa María Auxiliadora de Galapa (Colombia) (rapadilla@uninorte.edu.co) (<https://orcid.org/0000-0002-5433-4626>)

Jorge Alberto Amador-López is a professor at Fundación Centro Educativo Mixto de Galapa (Colombia) (jamador@cemga.edu.co) (<https://orcid.org/0000-0002-6173-8370>)

Dr. José Luis Olivo-Franco is a professor at Institución Educativa Técnica Agrícola Juan Domínguez Romero de Caracolí-Colombia (Colombia) (joseolivofranco@hotmail.com) (<https://orcid.org/0000-0002-7781-1261>)

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Abstract

Teachers generally focus on promoting criticality and try, at all costs, to develop intertextuality processes in the student body, leaving aside the other essential levels to achieve the final product. In this sense, it is vital to bear in mind that the order of the factors, in this case, would alter the result, since *velis nolis* must carry out a cycle and specific procedures to achieve the objectives set in advance. For this reason, it is necessary to show that the readings for less and above than expected according to some characters and quantity of fixations affect textual comprehension. On the other hand, a transformative sequential design with a mixed approach was applied to this research, a sample of 80 students from the secondary level of a private educational institution in the municipality of Galapa-Colombia was selected, who read three texts related to the electromagnetism on the Eye tracker T.120 screen and using Tobii.3.4.6 software. The results allow us to confront from the teaching practice different positions on the incursion of these variables in the reading processes. Finally, it is concluded that visual fixations play a main role for the understanding of a text and, therefore, the design of a didactic proposal that takes science and the image as a reference is proposed as a prospective one in order to seek adequate understanding by the student reader.

Keywords: Visual perceptions, expository texts, text comprehension, readability, basic education, electromagnetism.

Resumen

Por lo general, el profesorado se centra en promover la criticidad y trata, a toda costa, desarrollar procesos de intertextualidad en el estudiantado, dejando de lado los otros niveles indispensables para conseguir el producto final. En este sentido, es vital tener presente que el orden de los factores, en este caso, si alteraría el resultado, ya que *velis nolis* se debe llevar un ciclo y unos procedimientos específicos para lograr los objetivos trazados con antelación. Por este motivo, es necesario demostrar que las lecturas por menos y encima de lo esperado conforme a unos caracteres y cantidad de fijaciones inciden en la comprensión textual. Por otra parte, en esta investigación se aplicó un diseño transformativo secuencial con enfoque mixto, se seleccionó una muestra de 80 estudiantes de nivel secundario de una institución educativa privada del municipio de Galapa-Colombia, quienes realizaron una lectura de tres textos relacionados con el electromagnetismo en la pantalla del *Eye tracker* T.120 y con el uso del *software* *Tobii.3.4.6*. Los resultados permiten confrontar desde la práctica docente distintas posturas sobre la incursión de estas variables en los procesos lectores. Finalmente, se plantea como prospectiva el diseño de una propuesta didáctica que tome como referente la ciencia y la imagen para buscar la comprensión adecuada por parte del lector.

Descriptores: Percepciones visuales, textos expositivos, comprensión de textos, lecturabilidad, educación básica, electromagnetismo.

1. Introduction

Although visual fixations may have applications in various areas (Clay et al., 2019), their impact on understanding expository texts has not been explored in High School (EBS), specifically in topics about electromagnetism (herein after *emg*), characterized by having complex and difficult-to-access content, since the paragraphs they present are loaded with a specific discourse, monosemic, with a lexicon stratified and directed to a particular audience; moreover, it must be analyzed from semantic and pragmatic perspectives that facilitate access to textual understanding. Therefore, it is essential to address from this study those cognitive aspects related to visual fixations, the general characteristics of expository texts, their understanding and the easiness to read (Jarodzka & Brand-Gruwe, 2017).

1.1. Visual fixations

According to Reyes (2017) visual fixation is “the duration of the visualization committed to a particular objective located in the foveal range of the human eye” (p. 27). On the other hand, the ones removed are the rapid eye movements that occur between different fixations that are evident against a stimulus object. Then, as a consequence, the number of fixations produces a numerical measure that carries intrinsic information to assess, in a certain way, the ocular behavior.

Likewise, according to Gila et al. (2009), the eyes have inner muscles that regulate the diameter of the pupils and the coverage of the lens, since it has movements driven through certain cranial nerves such as the third, fourth and sixth, they achieve that the image is focused on the retina, allowing to obtain the external information necessary for understanding. There are three types of eye movements in humans: automatic movements, voluntary refixation movements, saccadic, and micro-movements related to ocular fixation, micro-saccadic and derivatives.

Finally, according to Rayner et al. (1996) the time of fixation when reading texts is defined by variables such as the frequency of words, the ambiguity of the lexicon, semantic relations, anaphors, contextual constraints and syntactic complexity. In addition, it is linked to linguistic variables that are intimately connected with the eye movements of each individual.

1.2. General characteristics of the expository text

According to Alonso and Seré (1997, p. 320): “Expository texts are very difficult to understand because of their characteristics”. This textual typology includes in its traits a lexical selection, i.e., the use of endocentric monoreferential terms that are suited to a monosemic linguistic content where the use of synonyms is avoided.

Secondly, it incorporates its own terminological field, i.e., it has a relationship between the exclusive texts and their meaning; i.e., they lead to the production of new documents with a cult lexicon that lead to conceptual coherence.

Third, expository texts have sociolectal variation, which implies the use of vocabulary and its relationship with a specific area of knowledge. This textual typology extends to a reader who must have special characteristics such as belonging to a social homogeneous sector, possessing some cultural background around sciences. Indeed, the greater understanding about the sociolect used in the text, the greater the possibility of understanding the individual.

Another condition is the syntactic organization or linguistic economy in textual content, with specific vocabulary and specific and concise descriptions. The scientific and the syntactic must be prioritized for a specific description; it tends more to explanation and description than to narrative and argumentation; it lacks of quantifiers and uses few qualifiers because of its structure. In addition, it uses precise scientific objectives with a purpose.



Finally, there are not rhetorical elements, i.e., the existence of linguistic neutrality, which implies descriptive efficiency, omission of some semantic expressive elements that reduce the length of the text, but not its scientific purpose.

1.3. Understanding Expository Texts

From a linguistic perspective, comprehension is related to communicative processes, the connection between text, reader, context and author, all seen from different angles to achieve assimilating communicative intention and facilitating the process of textual comprehension. Martínez et al. (2008), define the comprehension of texts as:

A series of cognitive processes that involve forming and connecting propositions in a sentence, making inferences for those that connect textual and knowledge-based elements, and forming macro-ideas or information integration structures. (p. 321)

According to López and De León (2017, p. 270), expository texts are “those that provide reliable information, justifications about events, phenomena, and topics, and whose purpose is to inform and/or persuade the reader”. These authors also state that understanding involves a cyclical procedure that requires integration and construction of meanings, and to achieve understanding it is essential to go through three levels of representation: first the creation of a mental model in which the text is broken down, the processing of the data and the link of the data with lexical, hierarchical and linguistic structures; subsequently, micro and macro structures would be created, consisting of a two-level propositional abstraction network of the meaning of the text, one from the local and the other from the global of the text.

Therefore, when it comes to textual comprehension, it refers to the complexity of the text and its inherent characteristics (López and De León, 2017). In this way, the expository texts require that the reader is more committed and has

prior knowledge in order to access interpretation and later understanding. Therefore, to understand it is essential to implement an author-reader correlation, so it is inescapable to relate experiences and emotions that link the new content with the previously acquired knowledge.

Another relevant aspect is the identification and interpretation of the lexicon, which facilitates semantic understanding; then a wrong interpretation of the glossary produces misunderstanding. This textual typology is impersonal, objective and accurate, which are characteristics typical of science and that are complemented with didactic resources and strategies such as graphic organizers, which could guarantee the effectiveness of understanding.

Likewise, an expository text has specific characteristics that make it more complex for its interpretation; its function is also determined and contextualized from the scientific perspective.

Similarly, Alonso and Séré (1997) say that:

An expository text has certain characteristics that make them complex as belonging to an area of knowledge, having a speech with specific syntax and the determined use of the language; they also have lexical or specific terms that make understanding more complex because they are in an academic environment detached from everyday life. (p. 321)

Finally, it can be said that the reader is the main responsible for the process, since its motivation to read and its interpretation facilitates access to content. On the other hand, the text should serve the reader as a facilitating mechanism for extracting data on functions, classification, purposes, communicative intention and characteristics of the document.

1.4. Readability

Readability is a term seen from different perspectives. In the first instance, according to Sigaud-Seals (2010) from the stylistic is the extension of phrases, periodicity of expressions, syntactic and



morphological aspects that determine the proper and assertive reading that enables the comprehension of texts. On the other hand, Campos et al. (2014) affirm that “readability is the ease/difficulty with which a text can be read and understood” (p. 16). This means that understanding depends on the optimal performance of the process. It is not just decoding, it is the domain of visual resources and its association with written documents for the purpose of allowing instant understanding (Rojas et al., 2020).

It should also be noted that the lexical diversity of texts requires the reader to take a motivational attitude to understand, since he/she must associate the greatest number of words. Therefore, if the reader does not know the vocabulary, their understanding will be inconclusive or null. On the other hand, syntactic complexity can affect an individual’s reading performance, because he/she must understand the structure of sentences and pragmatic content; in other words, short, simple, and simple propositions will be easier to interpret than compound sentences.

In short, the more complex the text is, the more difficult it will be to understand it, since it is up to the reader to associate lexical terminologies, grammatical and syntactic aspects that relate pragmatically in the same content. As a result, they have an impact on reader performance and on the behavior of readers over the text.

2. Methodology

A sequential transformational design was applied, which means having as its purpose a transformative conceptual frame of reference, or defense of a specific ideology, as well as implementing from the quantitative phase or the qualitative phase a series of resources on equal scale to achieve certain research goals (Cresswell et al., 2008). Based on a quasi-experimental design (Ramón, 2000) and under the guidance of a mixed approach, a sample of 80 schoolchildren from 7 and 8 grade levels of secondary education were selected, who belong to Centro Educativo Mixto de

Galapa-Colombia, a private school located in Barranquilla, to be able to analyze whether the readings of *emg* related topics performed above or below the expected level according to a few characters and number of paragraph fixations affect the understanding of expository texts.

This sample was selected from a population of 112 students, and control variables were included, such as being from 12 to 13 years old, not having visual or cognitive deficits and not having prior knowledge regarding the subjects of the texts. It was also necessary to apply an operational memory test (Wechsler Subgroup), bearing in mind that participants had to exceed the lower limit (16).

Regarding the quasi-experimental, what was done at random was to assign an experimental group to the sample members by simple and systematic random sampling units in four groups of 20 participants A, B, C and D.

Initially, children read individually on the Eye tracker T.120 screen three readings related to battery, alternator, and electric chimes after having observed images on different scales of iconicity, then each student was tested for understanding expository texts (hereinafter TPC) (Martinez et al., 2008), in which the texts appeared again with a series of items that allowed to verify if the readings on the screen could affect the results of the test conducted.

The *emg* topics selected for this research were not part of the program for the sample participants. The texts about the battery, the alternator and the chime were submitted to experts in the areas of cognition, language and physics teaching. Criteria such as macrostructure, superstructure, model, functionality, clarity, coherence and relevance were a reference point based on the reconstruction of texts. For this purpose, an example of evidence related to the text “The Penguins” taken from Martinez et al. (2008) allowed to make adaptations from the semantic-conceptual aspects, the structure of the items to be evaluated according to the educational level of the schoolchildren and the characteristics of an expository text, as shown in table 1.



Table 1. Items of the TPC

Capture of ideas in a sentence	Anaphoric inference	Inference-based on knowledge	Formation of macro-ideas
The Reader must			
Break down the sentence into propositions; analyze the semantic and syntactic relationships that propositions have with each other.	Connect two ideas that appear in the text.	Activate previous knowledge schemes.	Select what is common with the topic read, omitting non-essential information.

Source: Padilla (2020, p. 316).

It is necessary to emphasize that the TPC was validated, so a pilot test was previously conducted on 80 schoolchildren of Institución educativa María Auxiliadora de Galapa-Colombia. It was necessary to guarantee that vocabulary, grammatical structure, language, and format of items were appropriate for the student, and time duration was determined by cognitive processes or complex skills involving this type of testing (Medina-Díaz & Verdejo-Carrión, 2020).

Regarding the validation of the test, the results showed that children presented difficulties in three questions, and these were subjected to a restructuring process. Each assertive answer was scored with 0/1 points, with the highest score being 18 points, as there were six questions per topic. From this pilot, it was established that one hour and 30 minutes must be taken into account to apply TPC with this type of texts, an overall time used by the group of participants.

Using the Tobii 3.4.6 software, CF (number of fixations) was evaluated in school children using the Eye Tracking technique, which is intended to “record information about what the participants found interesting, i.e., this caught their attention during the various observations of the images presented in the software” (Duchowski, 2007, p. 5).

3. Results and analysis

The number of characters versus the number of fixations in reading comprehension processes

were taken into account, which were criteria that enabled, with the help of the Tobii 3.4.6 software, to identify whether children read less than expected (i.e. below the number of fixations set out in Table 2); read more (above the number of fixations set out in Table 2); made incomplete readings; did not read the texts related to the battery, the alternator and the chime; and how they became a reference for checking the results obtained in the TPC.

Less fixations are related to regressions and more fixations are directly related to refixing. According to Fernández (2011), “Refixations, reflect the difficulty of lexical processing of the word and regressions may also be an indicator of an oculomotor difficulty, where there is an adjustment of the fixation position in the word, without taking into account the lexical state of the fixed word” (p. 52-53). However, other explanations about regressions are related to those presented by Tremps-Garín (2014), who claims that regressions present in the reading processes are characterized by giving importance to the observation of the most distinguished aspects of the text; in addition, it includes aspects of textual reading such as retaking words, misread phrases, check meanings and make corrections in oculomotor failures.



Table 2. Number of characters and fixations for each paragraph

Topics	Number of characters	Number of Fixations or CF (Number of Fixations)
Battery		
Paragraph 1	277	39.6
Paragraph 2	332	47.4
Paragraph 3	501	71.6
Alternator		
Paragraph 1	188	26.9
Paragraph 2	305	43.6
Paragraph 3	414	59.1
Chime		
Paragraph 1	199	28.4
Paragraph 2	254	36.3
Paragraph 3	367	52.4

Source: Padilla (2020, p. 208)

Based on the above table, the following results were obtained per group from the data provided by the software:

Group A

Group A identified three incomplete readings in paragraph 1 related with the battery, and 1 in paragraph 3 of the same text. Three incomplete readings were also found in paragraph 1, 3 in paragraph 2 and 1 in paragraph 3 of the alternator. Only 1 fixation above the expected level was identified in paragraph 1 of the alternator (26.9 fixations). Only incomplete reading in paragraph 1 was seen by a student on the chime reading. More than expected fixations were observed in the reading of the text related to chime in paragraph 1 (28.4 fixations) and 1 in paragraph 3 (52.4); 2 in the text of the battery in paragraph 1 (39.6), 2 in paragraph 2 (47.4) and 2 in paragraph 3 (71.6), unlike the alternator on which 1 fixation was obtained in paragraph 1 (26.9 fixations). In the TPC result, the hits on the battery paragraph were higher, and the least hits were

on the chime. From 20 school members of the group, 12 passed above 50% the 18 test questions.

Group B

Incomplete readings were present in group B; this is seen in the reading in paragraph 1 related to the battery in which two children did not do the reading as expected; thus, it happened once in paragraph 2 and two in paragraph 3. Five children in paragraph 1, two in paragraph 2 and two in paragraph 3 did not fully read the alternator text. The text about the chime was read in its entirety by all members of the group. Regarding the above-expected fixations, it can be said that they focused more on chime, 1 in paragraph 1 (28.4 fixations), 1 in paragraph 2 (36.3 fixations) and 4 in paragraph 3 (52.4 fixations). In the TPC result, the hits on the battery-related items were higher and the hits on the chime were lower. From 20 children, 13 passed over 50% the 18 test questions.



Group C

Regarding group C results, six readings were incomplete in paragraph 1 of the alternator, three in paragraph 3 and one in paragraph 2. Regarding fixations, two above those expected were equally present in paragraph 1 (39.6 fixations), paragraph 2 (47.4 fixations) and paragraph 3 (71.6 fixations) of the text related to the battery. Two fixations more than expected were identified in paragraph 2 (43.6 fixations) of the text related to the alternator. When reading the text about the chime, some children exceeded the above-expected fixations, one in paragraph 1 (28.4), one in paragraph 2 (36.3) and three in paragraph 3 (52.4).

Despite the existence of incomplete readings, it can be stated that these occurred generally and to a lesser extent in texts about the alternator. For that reason, the items evaluated in the TPC results showed the greatest number of hits in the alternator text compared to the other texts. The items related to the chime test were the least successful. From 20 children, 13 presented 50% of the 18 questions in the test.

Group D

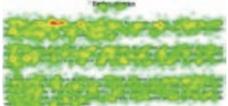
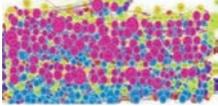
Group D obtained the highest number of fixations for less than expected according to the

number of characters and fixations for reading text on the Stimulus screen. 2 fixations were identified in paragraph 1 of the battery (39.6 fixations) two in paragraph 2 (47.4 fixations) and paragraph 3 (71.6 fixations). A more than expected fixation was obtained in paragraph 1 of the text related to the battery. Less readings were also identified in the texts about the alternator in paragraph 1 (26.9 fixations) by three children, whereas in paragraph 2 (43.6 fixations) three fixations were more than expected and three in paragraph 3 (59.1 fixations).

The text related to the chime had a fixation above the expected in paragraph 3 (52.4 fixations) by a student. The items evaluated in the Expository Text Understanding (TPC) test yielded results in the text related to the alternator, the items with less success in the answers are those related with the chime. In the test, 14 children obtained correct answers above 50% of the 18 questions in the test. No incomplete readings were performed.

It was possible to know after the observations of the students on the screen stimuli different eye movements and certain phenomena related to the processing of the information, as indicated in Table 3.

Table 3. Phenomena related to the processing of information

Mapas de calor	Mapas de rutas	Mapas de opacidad
		
<p>Fig. Heatmaps. Through these maps “areas with a higher density of fixations are observed, marking with red the areas with more fixations, and it gradually varies to yellow and green as the number of fixations decreases” (Martinez et al., 2015, p. 7).</p>	<p>Fig. Gazeplot. “It serves to provide detailed information about the user’s behavior, such as first fixations, display duration, and locations” (Reyes, 2017, p. 27).</p>	<p>Fig. Opacity maps. They allow to see more clearly the area that has been most observed. They provide the same information as heat maps, but in a different way (Martinez et al., 2015, p.7).</p>

Source: Own elaboration.



4. Discussion

Something that is not taken into account by language teachers or people linked to other disciplines is the fact that visual fixations play a major role in the understanding of a text, because it is through sight that the information enters, which will be then stored in the brain (Dharmawansa et al., 2015). Then all is part of the foveal range of the human eye, the number of fixations, the areas of interest and, therefore, the motivation of the individual to achieve the comprehension of texts. It is important to mention that if there is no motivation there will be no fixations either; without either of them there will be no proper reading process, much less understanding. In this regard, it is consistent to see how the results of the heat maps show that the visual fixations focus on the areas of interest of the student (Cuesta-Cambra et al., 2017).

Questions arise from the above, such as what is more important in an individual's comprehensive reading process, the levels of reading performance or the number of visual fixations that occur during the reading? Why was group D the one who read the most and had less readings than expected? Why was there no overreading in group D?

It is worth noting that teen reading processes are intimately related to different social, cultural and emotional variables. Therefore, to ask whether a text addresses the same issue in terms of coherence and global cohesion, what makes paragraph 3 to be more understandable and have more readings than expected, while at the same time it has more incomplete readings or null readings?

In this part, it is worth citing Pozo (1996) from the Piaget view of psychology, who examines some considerations that may answer these questions. Thus, in the cognitive perspective, there are mutations in terms of formal thoughts and operations. In other words, teenagers stop thinking and acting as a child, begin to think and conceive reality in a different way, their objec-

tives change, they tend to see contents not from the level of the concept or definition but from the practical aspect.

The understanding of a scientific text is very complex since the terms used are generally monosemic, circumvent the use of synonyms and tend to be specific in an area of knowledge. This could be a reason why refixations and regressions are relevant in readings (Fernández, 2011; Tremps-Garín, 2014), because reading less or more regarding a certain number of character fixations in the paragraphs of this type of text would be more linked to a language that is not so common in the school group; as well as because it has very complex characteristics that prevent reaching higher levels of understanding. However, it is not always true to say that one cause of regressions is oculomotor failures. It is therefore necessary to build on previous knowledge to enable the acquisition of new material on the subject (Olivo-Franco, 2021).

In addition, motivation determines understanding and can therefore be considered an internal and positive attitude that facilitates learning (Carrillo et al., 2009; Herrera y Fraga, 2009). The reader must have a reading purpose, goals that allow him/her to be motivated. The reader must perceive the text from a pragmatic perspective, in which he/she relates it with the context. Then, it is necessary to recognize the communicative context of the text, to relate it to the immediate and cultural context to have clear interests and to understand the senses of the document under study. In this way, pragmatics involves critical analysis by the reader, creating understanding.

Teachers normally do not take into account the time students spend reading texts, which limits them in the process. In the image, for example, there is a limited time of 18 seconds of observation and this was observed when piloting observations of images related to electromagnetism with three students, since there were some distractions on the screen of the Eye tracker T.120 after this time (Padilla, 2020); however, the length of the



paragraphs at various times generates discouragement and fatigue for reading. Thus, the three texts used on this research only had three paragraphs, in which the student had to select the topic read and omit the non-essential information, all this using previous knowledge.

Other important assessments refer to examining whether the length of paragraphs and texts generally influenced the fact that some students did not read or overread, such as demotivation, fatigue and eye fatigue.

5. Conclusions

Most readers have difficulties in understanding expository texts because they normally lack of a rich and suitable vocabulary that allows them to access a coherent discourse to describe what is observed. Grammar structures, visual perceptions, and student interests are the main influencing factors of reading comprehension processes, because lack of reading, overreading or the comprehensive reading depend on these processes. It is necessary to emphasize that the time devoted to these activities is scarce, since generally, the teaching-learning of reading is presented as a finished product that does not keep a sequential and continuous process, which must be in constant evaluation.

Another aspect to keep in mind is the incidence of perceptive stimuli of the eye fovea in texts, the areas of interest and the understanding of semantic resources inherent in the document faced by the reader, who must be motivated and must understand the terms found in the document to facilitate the understanding of the document.

It should not be ruled out that although there is a high degree of visual capture and fixation, such processes in which information is extracted and organized would also be influenced by the fixation levels of the established parameters by the quantity of visual fixations, overreading, the different regressions formed during the reading process, the emotional states, the interests of the reader, among other aspects.

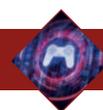
On the other hand, humans have unique capabilities to use sight quickly, effectively and automatically, without requiring additional effort (Trempe-Garín, 2014; Reyes, 2017). These skills are the result of the number of fixations that were captured during the specific observation of an area of interest; these areas significantly influence the semantic understanding of expository texts.

However, the processes of accommodation, convergence, divergence and binocular vision do not lose their sequential disposition. This situation occurs in the reading of expository texts by saccadic movements, which are fast and irregular, and orient the look toward visual stimuli whose variations in number, speed, length of the text and the motivation of the reader acquire importance in the cognitive processes.

The process of reading comprehension requires a variety of elements other than those commonly worked in schools, as cognitive, metacognitive, biological, emotional and psychological aspects are envisioned. It is important to mention that expository texts can generate minor fixation guidelines because of their intrinsic characteristics. In contrast, this research determined through the Eye tracker test that a minimum group of observers did not fix their eyes on all areas of interest present in the images and ignored the title of each of the texts in the TPC test; likewise, some only read sentences present in one paragraph, others read in one, two, or three paragraphs; and many others read absolutely nothing.

On the other hand, the pedagogical and didactic strategies presented in the text would be useful to facilitate the understanding, as well as the interest presented by the reader. For this reason, expository texts are aimed at an objective group with specific characteristics that restrict the actions of the reader.

As described above, it is confirmed that expository texts have certain limitations for an audience not prepared for their understanding. All of these are limiting aspects to achieve tex-



tual understanding, but it is the task of teachers to find the tools to guide children to find the appropriate process to understand what they read. It is not a unique task of language teachers, but a commitment of teachers from different disciplines and the same student in their self-learning.

Consequently, the more knowledge the reader has about the lexicon used in the text, the greater the understanding. However, this is not due to the lack of knowledge of the sociolects and technolects employed and the little scientific background on the topics used. Another difficulty that often arises is the existence of linguistic neutrality or omission of certain expressive semantic elements that possess scientific value despite a short extension. Indeed, there are multiple factors that would facilitate the understanding processes. The work is not easy at all, but it is a task in which all the actors involved must contribute to facilitate the process. It is intended that with the implementation of these instruments in school groups of two or more educational institutions, results can be contrasted to continue testing hypotheses regarding the incidence of visual fixations and characters in the understanding of expository texts.

Acknowledgements

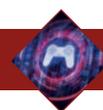
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- Tremps-Garín, M. D. C. (2014). *Estudio de los movimientos oculares, la comprensión lectora y su influencia en el rendimiento escolar* (Tesis de Maestría) <https://bit.ly/3CtihvS>



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Publication guidelines

(Normas Editoriales)



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Publication Guidelines of «Alteridad»

<http://alteridad.ups.edu.ec/>
p-ISSN:1390-325X / e-ISSN:1390-86

1. General information

«Alteridad» is a bilingual scientific publication of the Salesian Polytechnic University of Ecuador (UPS), published since January 2006 uninterruptedly, on a semi-annual basis (January-July).

It is an arbitrated scientific journal, which uses the peer-review system under the double-blind review, in accordance with the publication standards of the American Psychological Association (APA). The compliance with this system ensures authors an objective, impartial and transparent review process, making it easier for authors to be included in reference international databases, repositories and indexes.

«Alteridad» is indexed in the Web of Science's Emerging Sources Citation Index (ESCI), at the Scientific Electronic Library Online (SciELO), in the REDALYC Scientific Information System, in the directory and selective catalog of the Regional Online Information System for Scientific Journals of Latin America, the Caribbean, Spain and Portugal (Latindex), in the Directory of Open Access Journals (DOAJ), in the European Reference Index for the Humanities and Social Sciences (ERIHPLUS), in the Ibero-American Network of Innovation and Scientific Knowledge (REDIB), on the Dialnet Portal; it is evaluated in the Information Matrix for Journal Analysis (MIAR), the Integrated Classification of Scientific Journals (CIRC), and the Qualis review system for CAPES journals. In addition, it is in repositories, libraries and specialized catalogs around the world.

The journal is published in two versions: electronic (e-ISSN: 1390-8642) and printed (ISSN: 1390-325X) in Spanish and English; each manuscript is identified with a Digital Object Identifier System (DOI). All articles published in «Alteridad» have the Creative Commons Attribution-Non-Commercial-Share Equal license (RoMEO blue journal).

2. Scope and policies

2.1. Topics

«Alteridad» is a journal specialized in Education and its transdisciplinary lines such as Didactics, Public Policies, School Management, Edu-communication, ICT, Social Pedagogy, among others; and all those disciplines related to the main topic.

2.2. Sections

The journal has a semi-annual periodicity (20 articles per year), published in January and July and has two sections of five articles each by number; the first referring to a **Monographic** topic



prepared in advance and with thematic topic and the second, a section of **Miscellaneous**, composed of varied contributions within the theme of the publication.

2.3. Contributions

All manuscripts must be original, and must not have been published in any other journal or must not be in the arbitration or publication process in another journal. Empirical research results are published in Spanish, Portuguese or English, and studies and state-of-the-art are also admissible:

- **Researches:** 5000 to 6500 text words, including title, abstracts, descriptors, tables and references. Particular assessment will be made of research results, methodological rigor, the relevance of the subject, the quality of scientific discussion, the variety, timeliness and richness of bibliographic references (preferably publications indexed in JCR and Scopus). At least 35 references are expected.
- **Literature studies and reviews:** 6000 to 7000 text words, including tables and references. The debate generated, the relevance of the subject, the originality, current and selective contributions and references of around 70 works (preferably from publications indexed in JCR and Scopus) will be particularly valued.

3. Editorial process

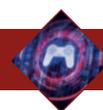
3.1. Submission of manuscripts

Manuscripts must be submitted only and exclusively through the Open Journal System (OJS), in which all authors must register in advance, although only one will be responsible for the correspondence. No author may submit or review two manuscripts simultaneously, estimating a time of four consecutive numbers (2 years). An article may have a maximum of 3 authors, although if justified depending on the size of the study, there may be up to 5.

«Alteridad» informs the reception of the manuscript submitted by the authors; the information related to the acceptance or rejection of the manuscript is sent by email and the platform; and in the case of acceptance, the author is also informed of the editing process.

In the website of the journal, in the Guidelines section, are presented the Guidelines for the Authors, the format of the structure of the articles, the cover page and cover letter, the pre-submission list, the evaluation forms by the external reviewers and a guide for the submission of the article through OJS. Before the submission, it is strongly recommended that the manuscript be checked with the Pre-Check Protocol. Two documents should be sent simultaneously:

- a) Cover page and cover letter (use the official model), on which will appear
 - Cover page (Title, Abstract and key words provided in the Manuscript).
 - Full name of each of the authors, organized in priority order; followed by the professional category, institution, email of each author and ORCID number. It is mandatory to indicate if the authors have a PhD academic degree (include Dr. before the name).



- A **Cover letter** will also be included indicating that the manuscript is an original contribution, has not been sent or evaluated in another journal, with the signature of the authors, and acceptance (if applicable) of formal changes to the manuscript compliant with the rules and partial transfer of rights to the publisher.
- b) Fully anonymized **manuscript**, in accordance with the rules referred to in section 4.

3.2. Revision process

Upon having received the document and in a maximum period of 30 days, the correspondence author shall receive a notification, indicating whether the manuscript is estimated or dismissed for the arbitration process by the scientific reviewers. In the case that the article has formal problems, or does not address the educational subject, or has a high similarity percentage to another document(s), the editorial board shall dismiss the work without the option to return it. Conversely, if it has superficial problems, it will be returned to the author for the corrections before starting the evaluation process. The submission date of the article will be considered based on the final submission when the article is presented with the corrections.

The articles will be scientifically evaluated by an average of three experts of the topic. Reports will indicate the following recommendations: Accept the Submission, Publishable with Modifications, Sent the manuscript back for its Review, Not Publishable. The acceptance or rejection of the manuscript for its publication will be decided from the analysis of external reports. In the case of dissenting results, it shall be forwarded to a new opinion, which shall be final. The protocol used by reviewers is public (researches; studies and state-of-the-art).

In general, once the external scientific reviews are taken into view, the criteria justifying the decision on the acceptance/rejection of the manuscript by the Editorial board are:

- Current and novelty.
- Relevance and significance: Advancement of scientific knowledge.
- Originality.
- Reliability and scientific validity: Proven methodological quality.
- Organization (logical coherence and formal presentation).
- External support and public/private funding.
- Co-authoring and internationalization degree of the proposal and the team.
- Presentation: Good writing.

The timeline for the scientific evaluation of manuscripts, after the previous estimation procedures by the Editorial Board is a maximum of 100 days. In relation to the manuscripts sent for Calls for papers, their scientific review dates begin once the call finishes. Manuscripts that are positively evaluated and require modifications must be sent with the changes, within the next 15 days.

3.3. Editing and publishing of the manuscript

The edition and layout processes of the accepted articles is performed by the Technical Board of the journal in coordination with the Abya-Yala Editorial. «Alteridad» reserves the right to make style corrections and editorial changes if necessary to improve the manuscript. A proof of printing in PDF format will be sent to the authors for the correction of typography and spelling in a maximum of three days.

Abya-Yala Editorial will carry out, free of charge for the authors, the professional translation of the final version of the manuscript into the English language (or Spanish, according to



the original version), which will guarantee the consultation and international dissemination of the manuscript. The articles will be published on the journal's platform in a timely manner. All articles, in their two language versions (Spanish and English), are published in PDF, HTML, EPUB and XML-Jats format.

3.4. Promotion and dissemination of the published article

The authors are committed to give maximum diffusion to their article published in «Alteridad». In this sense, they are encouraged to promote their published article on academic networks (Academia.edu, ResearchGate, Mendeley, Kudos), social (Twitter, Facebook, LinkedIn, also publishing the DOI), institutional repositories, web or blog staff, among others. Authors are also encouraged to share the published article through email lists, research groups and personal contacts.

«Alteridad» has a Metric Measurement System (PlumX) that allows verifying the compliance with this commitment. For the submission of future articles by authors of «Alteridad», the impact of previous works will be taken into account.

4. Structure of the manuscripts

The manuscripts shall be submitted in typeface Arial 10, simple spacing, fully justified and without tabs or white space between paragraphs. Only large blocks (title, authors, abstracts, key words, credits, and captions) will be separated with white space. The page must be 2 centimeters in all its margins. Manuscripts must be submitted in Microsoft Word document (.doc or .docx), requiring the file to be anonymized in File Properties to avoid the information related to the identification of the author/s.

4.1. Cover page

Title (Spanish and English): Concise but informative, in Spanish on the first line and in English in the second, consisting of as many significant terms as possible. The title is not only the responsibility of the authors, and changes can be proposed by the Editorial Board. A maximum of 80 characters with space are accepted.

Abstract (Spanish and English): It must be presented in a concise way and in this order: Justification, objectives, methodology used (approach and scope), more relevant results, discussion and main conclusions. It must be written impersonally "The present work analyzes...". In the case of the Abstract, the use of automatic translators will not be accepted because of their poor quality. It will be between 220/230 words.

Key words (Spanish and English): 6 keywords must be presented for each language version directly related to the topic of the manuscript. The use of the keywords presented in UNESCO's Thesaurus will be positively valued (<http://bit.ly/2kIgn8I>) or the controlled vocabulary of IRESIE (<http://bit.ly/2mzg4m8>).

4.2. IMRDC Structure

For those works involving empirical research, the manuscripts will strictly respect the IMRDC structure, with the headings of Economic Supports and Notes being optional. The works



involving Literature Studies and Revisions may be more flexible under their headings, especially in Methodology, Results and Discussion. In all types of works, bibliographic references are mandatory.

1. **Introduction and state of the play:** It should include the theoretical foundations and purpose of the study, using bibliographic citations, as well as the review of the most significant literature of the topic at the national and international level. The use of high-impact references (JCR and Scopus) will be positively valued.
2. **Methodology:** It must be written in a way that the reader can easily understand the development of the research. It should contain the explanation on the approach (quantitative, qualitative or mixed) and the scope (exploratory, descriptive, correlational or explanatory). When appropriate, it shall describe the sample and the sampling form, as well as it must refer to the type of statistical analysis applied. If it is an original methodology, it is necessary to set out the reasons that have led to its use and describe the possible limitations.
3. **Results:** Efforts will be made to highlight the most relevant results and observations of the investigation, describing, without making judgments, the material and methods used for the analysis. The results will be presented in figures or/and tables according to the journal's standards (See section 4.4). They will appear in a logical sequence in the text, tables or figures, avoiding data redundancy.
4. **Discussion and conclusions:** Discussion and conclusions: It will summarize the most important findings, relating the observations with interesting studies, pointing to contributions and limitations, without resulting in data already commented in other sections. In addition, the discussion and conclusions section should include deductions and lines for future research.

4.3. Economic support and notes

Economic support (optional): Council Science Editors recommends that authors specify the source of funding for the research. Works on the endorsement of competitive national and international projects will be considered a priority. In any case, for the scientific assessment of the manuscript, it must be anonymized with XXXX only for its initial evaluation, in order not to identify authors and research teams, which must be set out in the Presentation Letter and subsequently in the final manuscript.

Notes (optional) will go, only if necessary, at the end of the article (before references). They should be used to clarify terms or make marginal annotations. Note numbers are placed in superscript, both in the text and in the final note. Notes collecting simple bibliographic citations (without comments) are not allowed, as these should be in the references. If it contains a cite, the reference must also be found in the Bibliography section.

4.4. Bibliography

Bibliographical citations should be reviewed in the form of references to the text. Bibliography that is not cited should not be included in the text. Its number must be sufficient and necessary to contextualize the theoretical framework, methodology used and research results in an international research space: Minimum 35 for empirical research manuscripts, and around 70 for literature studies and reviews.

They will be presented alphabetically by the author's first last name (adding the second one only in case the first one is very commonly used, and joined with a hyphen). The quote should be extracted from the original documents, preferably journals and to a lesser extent books. Given the



significance of citation indices and impact factor calculations, the use of references from indexed publications in JCR and/or Scopus and the correct citation following APA 6 norms is valued (<http://bit.ly/2meVQcs>).

It is mandatory that quotes with DOI (Digital Object Identifier System) be reflected in the References (can be obtained on <https://search.crossref.org/>). All journals and books without DOI must contain a link (in its online version, if applicable, and in a shorten version using Bity: <https://bitly.com/>), and the websites must include the consultation date using the format provided.

Journal articles must be presented in English, with the exception of those in Spanish and English, in which case they will be presented in both languages using square brackets.

Norms for the references

a) Periodic publications

- **Journal article (one author):** Ochoa, A. (2019). The type of participation promoted in schools is a constraint factor for inclusive education. [El tipo de participación que promueve la escuela, una limitante para la inclusión]. *Alteridad*, 14(2), 184-194. <https://doi.org/10.17163/alt.v14n2.2019.03>
- **Manuscript from a journal (until twenty authors):** Guarderas, P., Larrea, M., Cuvi, J., Vega, C., Reyes, C., Bichara, T., Ramírez, G., Paula, Ch., Pesantez, L., Íñiguez, A., Ullauri, K., Aguirre, A., Almeida, M., & Arteaga, E. (2018). Sexual harassment in Ecuadorian universities: Content validation for instrument development. [Acoso sexual en las universidades ecuatorianas: Validez de contenido de un instrumento de medición]. *Alteridad*, 13(2), 214-226. <https://doi.org/10.17163/alt.v13n2.2018.05>
- **Manuscript from a journal (without DOI):** López, L., & Ramírez-García, A. (2014). Medidas disciplinarias en los centros educativos: ¿Suficientes contra el acoso escolar? *Perfiles Educativos*, 36(145), 32-50. <https://bit.ly/37Xd5mw>.

b) Books and chapters of books

- **Complete books:** Cuéllar, J.C., & Moncada-Paredes, M.C. (2014). *El peso de la deuda externa ecuatoriana*. Abya-Yala.
- **Chapter of books:** Padilla-Verdugo, J. (2014). La Historia de la Educación desde los enfoques del conocimiento. In E. Loyola (Ed.), *Ciencia, Tecnología y Sociedad (CTS). Miradas desde la Educación Superior en Ecuador* (pp. 107-128). Abya-Yala. <https://bit.ly/3etRnZH>

c) Electronic means

- Aunión, J. (2011, marzo 12). La pérdida de autoridad es un problema de toda la sociedad, no es específico del aula. *t*. <https://bit.ly/2NlM9Dp>

Guidelines for headings, tables and figures

The headings of the article shall be numbered in Arabic. These will be without full case of capital letters, no underscores, no bold ones. The numbering must be at most three levels: 1. / 1.1. / 1.1.1. A carriage return will be established at the end of each numbered heading.



Tables and figures must be presented in the text in Microsoft Word® located on the place where the authors consider they should be. They shall be used only when necessary and suitable, their use should be limited for reasons of spaces (maximum 6 between tables and figures). Both must be listed in Arabic and titled with the description of their content. If the source of the table or figure is not of its own elaboration, the authors must incorporate the source consulted below the table [for example, Source: Romero-Rodríguez (2016, p. 32)].

Tables must be elaborated in Microsoft Word document, thus tables cut and pasted from other documents that cannot be edited in the diagramming process will not be accepted. The figures, in addition to being incorporated in the Microsoft Word document®, must be sent as supplementary material during the submission in the «Alteridad» OJS, with a quality greater than 600 dpi, in TIFF, JPEG or PNG files.

5. Fees and APC

«Alteridad» is an Open Access journal, included in the Directory of Open Access Journals (DOAJ) that offers all its production online for the entire scientific community. It also does not set any economic fees throughout the editorial process for the publication of the articles, including scientific review, layout and translation thereof. There is no publication fee, no Article Processing Charge (APC) associated with this publication, neither for authors nor for readers. The journal is also licensed by Creative-Commons Attribution-Non-Commercial-Share Equal (RoMEO blue journal), which allows free access, download and archive of published articles. All expenses, inputs and financing of «Alteridad» come from the contributions made by the Salesian Polytechnic University.

6. Ethical responsibilities

Each author shall submit a responsible statement of authorship and originality, as well as their ethical responsibilities.

- **Originality:** The works must be original and should not be evaluated simultaneously in another publication, being the responsibility of the authors to comply with this standard. The opinions expressed in the published articles are the responsibility of the author/s «Alteridad» as CrossRef®'s international partner, uses the CrossCheck® and iThenticate® anti-plagiarism tool to ensure the originality of the manuscripts.
- **Authorship:** The list of signatory authors should include only those who have contributed intellectually to the development of the work. Collaborating in data collection is not sufficient criteria of authorship. «Alteridad» rejects any responsibility for possible conflicts arising from the authorship of the manuscripts published.
- **Transmission of copyright:** the transfer of rights of the manuscript published in «Alteridad» will be included in the cover letter. The Salesian Polytechnic University (the publisher) has the copyright of published articles; it favors and allows the reuse of these under the license of use indicated above.



Normas de Publicación en «Alteridad»

<http://alteridad.ups.edu.ec/>
p-ISSN:1390-325X / e-ISSN:1390-8642

1. Información general

«Alteridad» es una publicación científica bilingüe de la Universidad Politécnica Salesiana de Ecuador (UPS), editada desde enero de 2006 de forma ininterrumpida, con periodicidad fija semestral (enero-julio).

Es una revista científica arbitrada, que utiliza el sistema de evaluación externa por expertos (*peer-review*), bajo metodología de pares ciegos (*double-blind review*), conforme a las normas de publicación de la *American Psychological Association* (APA). El cumplimiento de este sistema permite garantizar a los autores un proceso de revisión objetivo, imparcial y transparente, lo que facilita a la publicación su inclusión en bases de datos, repositorios e indexaciones internacionales de referencia.

«Alteridad» se encuentra indexada en el *Emerging Sources Citation Index* (ESCI) de *Web of Science*, en la *Scientific Electronic Library Online* (SciELO), en el Sistema de Información Científica REDALYC, en el directorio y catálogo selectivo del Sistema Regional de Información en Línea para Revistas Científicas de América Latina, el Caribe, España y Portugal (Latindex), en el *Directory of Open Access Journals* (DOAJ), en el *European Reference Index for the Humanities and Social Sciences* (ERIHPLUS), en la Red Iberoamericana de Innovación y Conocimiento Científico (REDIB), en el Portal Dialnet; está evaluada en la Matriz de Información para el Análisis de Revistas (MIAR), en la Clasificación Integrada de Revistas Científicas (CIRC), y en el sistema Qualis de revisión de revistas de CAPES. Además, se encuentra en repositorios, bibliotecas y catálogos especializados de todo el mundo.

La revista se edita en doble versión: electrónica (e-ISSN: 1390-8642) e impresa (ISSN: 1390-325X) en español e inglés; siendo identificado cada trabajo con un *Digital Object Identifier System* (DOI). Todos los artículos Published on en «Alteridad» tienen licencia Creative Commons Reconocimiento-No-Comercial-Compartir igual (RoMEO blue journal).

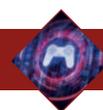
2. Alcance y política

2.1. Temática

«Alteridad» es una revista especializada en Educación y sus líneas transdisciplinarias como Didáctica, Políticas Públicas, Gerencia de Centros Escolares, Educomunicación, TIC, Pedagogía Social, entre otras; y todas aquellas disciplinas conexas interdisciplinariamente con la línea temática central.

2.2. Secciones

La revista tiene periodicidad semestral (20 artículos por año), publicada en los meses de enero y julio y cuenta por número con dos secciones de cinco artículos cada una, la primera referida a un tema **Monográfico** preparado con antelación y con editores temáticos y la segunda, una sección de **Misceláneas**, compuesta por aportaciones variadas dentro de la temática de la publicación.



2.3. Aportaciones

Todos los trabajos deben ser originales, no haber sido Published ons en ningún medio ni estar en proceso de arbitraje o publicación. Se editan preferentemente resultados de investigación empírica, redactados en español, portugués o inglés, siendo también admisibles estudios y selectas revisiones de la literatura (*state-of-the-art*):

- **Investigaciones:** 5000 a 6500 palabras de texto, incluyendo título, resúmenes, descriptores, tablas y referencias. Se valorarán especialmente los resultados de la investigación, el rigor metodológico, la relevancia de la temática, la calidad de la discusión científica, la variedad, actualidad y riqueza de las referencias bibliográficas (preferiblemente de publicaciones indexadas en JCR y Scopus). Se esperan mínimo 35 referencias.
- **Estudios y revisiones de la literatura:** 6000 a 7000 palabras de texto, incluidas tablas y referencias. Se valorará especialmente el debate generado, la relevancia de la temática, la originalidad de las aportaciones y referencias justificadas, actuales y selectivas de alrededor de 70 obras (preferiblemente de publicaciones indexadas en JCR y Scopus).

3. Proceso editorial

3.1. Envío de manuscritos

Los manuscritos deben ser enviados única y exclusivamente a través del *Open Journal System* (OJS), en el cual todos los autores deben darse de alta previamente, si bien uno solo de ellos será el responsable de correspondencia. Ningún autor podrá enviar o tener en revisión dos manuscritos de forma simultánea, estimándose una carencia de cuatro números consecutivos (2 años). Un artículo podrá tener como máximo 3 autores, aunque si se justifica en función del tamaño del estudio, podrán ser hasta 5.

«Alteridad» acusa recepción de los trabajos enviados por los autores, informa por email y la plataforma del proceso de aceptación o rechazo; y en el caso de aceptación, del proceso de edición.

En el Portal oficial de la revista, en la sección Normativas, están las Normas para Autores, el formato de estructura de los artículos, la Portada y Carta de presentación, el chequeo previo al envío, los formularios de evaluación por parte de los revisores externos y una guía para el envío del artículo a través de OJS. Antes de su envío se recomienda encarecidamente que se compruebe el manuscrito con el Protocolo de chequeo previo. Deben remitirse simultáneamente dos documentos:

a. Portada y Carta de presentación (usar el modelo oficial), en la que aparecerán:

- **Portada** (Título, Resumen y Descriptores previstos en el Manuscrito).
- **Nombre y apellidos completos** de cada uno de los autores, organizados por orden de prelación; seguido por la categoría profesional, centro de trabajo, correo electrónico de cada autor y número de ORCID. Es obligatorio indicar si se posee el grado académico de doctor (incluir Dr./Dra. antes del nombre).
- Se incluirá además una **declaración** (Cover letter) de que el manuscrito se trata de una aportación original, no enviada ni en proceso de evaluación en otra revista, confirmación de las



autorías firmantes, aceptación (si procede) de cambios formales en el manuscrito conforme a las normas y cesión parcial de derechos a la editorial.

b. Manuscrito totalmente anonimizado, conforme a las normas referidas en el epígrafe 4.

3.2. Proceso de revisión

En un plazo máximo de 30 días, a partir de la recepción del documento, el autor de correspondencia recibirá una notificación, indicando preliminarmente si se estima o desestima para el arbitraje por los revisores científicos. En el caso de que el artículo presente deficiencias formales, no trate el tema educativo, o tenga un elevado porcentaje de similitud con otro(s) documento(s), el Consejo editorial desestimaré el trabajo sin opción de vuelta. Por el contrario, si presenta carencias superficiales de forma, se devolverá al autor para su corrección antes de comenzar del proceso de evaluación. La fecha de recepción del artículo no computará hasta la recepción correcta del mismo.

Los artículos serán evaluados científicamente por una media de tres expertos en el tema. Los informes indicarán las siguientes recomendaciones: Aceptar el envío, Publicable con modificaciones, Reenviar para revisión, No publicable. A partir del análisis de los informes externos, se decidirá la aceptación o rechazo de los artículos para su publicación. En el caso de resultados discrepantes se remitirá a un nuevo dictamen, el cual será definitivo. El protocolo utilizado por los revisores es público (Investigaciones; Estudios y revisiones de la literatura).

En general, una vez vistas las revisiones científicas externas, los criterios que justifican la decisión sobre la aceptación/rechazo de los trabajos por parte del Consejo Editor son los siguientes:

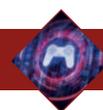
- Actualidad y novedad.
- Relevancia y significación: Avance del conocimiento científico.
- Originalidad.
- Fiabilidad y validez científica: Calidad metodológica contrastada.
- Organización (coherencia lógica y presentación formal).
- Apoyos externos y financiación pública/privada.
- Coautorías y grado de internacionalización de la propuesta y del equipo.
- Presentación: Buena redacción.

El plazo de evaluación científica de manuscritos, superados los trámites previos de estimación por el Consejo Editor, es de 100 días como máximo; los remitidos para *Calls for papers*, sus fechas de revisión científica se inician al cierre de los mismos. Los trabajos que sean evaluados positivamente y requieran modificaciones, deberán ser reenviados con los cambios, dentro de los siguientes 15 días.

3.3. Edición y publicación del manuscrito

El proceso de corrección de estilo y maquetación de los artículos Accepted ons es realizado por el Consejo Técnico de la Revista en coordinación con la Editorial Abya-Yala. «Alteridad» se reserva el derecho de hacer corrección de estilo y cambios editoriales que considere necesarios para mejorar el trabajo. A los autores de artículos se enviará una prueba de imprenta en formato PDF para su corrección únicamente de tipografía y ortografía en un máximo de tres días.

La Editorial Abya-Yala realizará, gratuitamente para los autores, la traducción profesional de la versión final del manuscrito al idioma inglés (o español, según la versión original), lo que garan-



tizará su consulta y difusión internacional. Los artículos serán Published on en la plataforma de la revista en tiempo y forma. Todos los artículos, en sus dos versiones idiomáticas (español e inglés), son Published on en formato PDF, HTML, EPUB y XML-Jats.

3.4. Promoción y difusión del artículo Published on

Los autores se comprometen a darle la máxima difusión a su artículo Published on en «Alteridad». En este sentido, se les exhorta a compartir y archivar su artículo Published on en las redes académicas (Academia.edu, ResearchGate, Mendeley, Kudos), sociales (Twitter, Facebook, LinkedIn, publicando en estos también el DOI), repositorios institucionales, web o blog personal, entre otras. Asimismo, se anima a los autores a compartir el artículo Published on a través de listas de correo electrónico, grupos de investigación y contactos personales.

«Alteridad» cuenta con sistemas de medición de métricas alternativas (PlumX) que permiten verificar el cumplimiento de este compromiso. Para la postulación de futuros artículos de autores de «Alteridad», se tendrá presente el impacto de los trabajos anteriores.

4. Estructura de los manuscritos

Los trabajos se presentarán en tipo de letra Arial 10, interlineado simple, justificado completo y sin tabuladores ni espacios en blanco entre párrafos. Solo se separarán con un espacio en blanco los grandes bloques (título, autores, resúmenes, descriptores, créditos y epígrafes). La página debe tener 2 centímetros en todos sus márgenes. Los trabajos deben presentarse en documento de Microsoft Word (.doc o .docx), siendo necesario que el archivo esté anonimizado en Propiedades de Archivo, de forma que no aparezca la identificación de autor/es.

4.1. Portada

Título (español) / Title (inglés): Conciso pero informativo, en castellano en primera línea y en inglés en segunda, conformado por el mayor número de términos significativos posibles. El título no solo es responsabilidad de los autores, pudiéndose proponer cambios por parte del Consejo Editorial. Se aceptan como máximo 80 caracteres con espacio.

Resumen (español) / Abstract (inglés): Se describirán de forma concisa y en este orden: Justificación del tema, objetivos, metodología empleada (enfoque y alcance), resultados más relevantes, discusión y principales conclusiones. Ha de estar escrito de manera impersonal “El presente trabajo analiza...”. En el caso del *Abstract* no se admitirá el empleo de traductores automáticos por su pésima calidad. Tendrá como extensión entre 220/230 palabras.

Descriptores (español) / Keywords (inglés): Se deben exponer 6 descriptores por cada versión idiomática relacionados directamente con el tema del trabajo. Será valorado positivamente el uso de las palabras claves expuestas en el Thesaurus de la UNESCO (<http://bit.ly/2kIgn8I>) o del Vocabulario controlado del IRESIE (<http://bit.ly/2mzg4m8>).

4.2. Estructura IMRDC

Para aquellos trabajos que se traten de Investigaciones de carácter empírico, los manuscritos respetarán rigurosamente la estructura IMRDC, siendo opcionales los epígrafes de Apoyos y Notas. Los trabajos que se traten de Estudios y revisiones de la literatura podrán ser más flexibles en sus



epígrafes, especialmente en Metodología, Resultados y Discusión. En todas las tipologías de trabajos son obligatorias las Referencias bibliográficas.

1. **Introducción y estado de la cuestión:** Debe incluir los fundamentos teóricos y el propósito del estudio, utilizando citas bibliográficas, así como la revisión de la literatura más significativa del tema a nivel nacional e internacional. Se valorará positivamente el uso de referencias de alto impacto (JCR y Scopus).
2. **Metodología:** Debe ser redactado de forma que el lector pueda comprender con facilidad el desarrollo de la investigación. Deberá contener la explicación sobre el enfoque (cuantitativo, cualitativo o mixto) y el alcance (exploratorio, descriptivo, correlacional o explicativo). En su caso, describirá la muestra y la forma de muestreo, así como se hará referencia al tipo de análisis estadístico aplicado. Si se trata de una metodología original, es necesario exponer las razones que han conducido a su empleo y describir sus posibles limitaciones.
3. **Resultados:** Se procurará resaltar los resultados y las observaciones más relevantes de la investigación, describiéndose, sin hacer juicios de valor, el material y métodos empleados para el análisis. Los resultados se expondrán en figuras o/y tablas según las normas de la revista (Ver epígrafe 4.4). Aparecerán en una secuencia lógica en el texto, las tablas o figuras imprescindibles, evitando la redundancia de datos.
4. **Discusión y conclusiones:** Resumirá los hallazgos más importantes, relacionando las propias observaciones con estudios de interés, señalando aportaciones y limitaciones, sin redundar datos ya comentados en otros apartados. Asimismo, el apartado de discusión y conclusiones debe incluir las deducciones y líneas para futuras investigaciones.

4.3. Apoyos y Notas

Apoyos (opcionales): El *Council Science Editors* recomienda a los autor/es especificar la fuente de financiación de la investigación. Se considerarán prioritarios los trabajos con aval de proyectos competitivos nacionales e internacionales. En todo caso, para la valoración científica del manuscrito, este debe ir anonimizado con XXXX solo para su evaluación inicial, a fin de no identificar autores y equipos de investigación, que deben ser explicitados en la Carta de Presentación y posteriormente en el manuscrito final.

Las notas (opcionales) irán, solo en caso necesario, al final del artículo (antes de las referencias). Deben ser utilizadas para aclarar términos o hacer anotaciones marginales. Los números de notas se colocan en superíndice, tanto en el texto como en la nota final. No se permiten notas que recojan citas bibliográficas simples (sin comentarios), pues éstas deben ir en las referencias. En caso de contener alguna cita, su referencia deberá encontrarse también en la sección de Referencias bibliográficas.

4.4. Referencias bibliográficas

Las citas bibliográficas deben reseñarse en forma de referencias al texto. No debe incluirse bibliografía no citada en el texto. Su número ha de ser suficiente y necesario para contextualizar el marco teórico, la metodología usada y los resultados de investigación en un espacio de investigación internacional: Mínimo 35 para los manuscritos de investigaciones de carácter empírico, y alrededor de 70 para los estudios y revisiones de literatura.

Se presentarán alfabéticamente por el apellido primero del autor (agregando el segundo solo en caso de que el primero sea de uso muy común, y unido con guion). Las citas deberán extraerse de



los documentos originales preferentemente revistas y en menor medida libros. Dada la trascendencia para los índices de citas y los cálculos de los factores de impacto, se valorarán positivamente el uso de referencias provenientes de publicaciones indexadas en JCR y/o Scopus y la correcta citación conforme a la Norma APA 6 (<http://bit.ly/2meVQcs>).

Es prescriptivo que todas las citas que cuenten con DOI (Digital Object Identifier System) estén reflejadas en las Referencias (pueden obtenerse en <https://search.crossref.org/>). Todas las revistas y libros que no tengan DOI deben aparecer con su link (en su versión on-line, en caso de que la tengan, acortada, mediante Bitly: <https://bitly.com/>), y de los sitios web además la fecha de consulta en el formato indicado.

Los artículos de revistas deben ser expuestos en idioma inglés, a excepción de aquellos que se encuentren en español e inglés, caso en el que se expondrá en ambos idiomas utilizando corchetes.

Normas para las referencias

a) Publicaciones periódicas

- **Artículo de revista (un autor):** Ochoa, A. (2019). The type of participation promoted in schools is a constraint factor for inclusive education. [El tipo de participación que promueve la escuela, una limitante para la inclusión]. *Alteridad*, 14(2), 184-194. <https://doi.org/10.17163/alt.v14n2.2019.03>
- **Artículo de revista (hasta veinte autores):** Guarderas, P., Larrea, M., Cuvi, J., Vega, C., Reyes, C., Bichara, T., Ramírez, G., Paula, Ch., Pesantez, L., Íñiguez, A., Ullauri, K., Aguirre, A., Almeida, M., & Arteaga, E. (2018). Sexual harassment in Ecuadorian universities: Content validation for instrument development. [Acoso sexual en las universidades ecuatorianas: Validez de contenido de un instrumento de medición]. *Alteridad*, 13(2), 214-226. <https://doi.org/10.17163/alt.v13n2.2018.05>
- **Artículo de revista (sin DOI):** López, L., & Ramírez-García, A. (2014). Medidas disciplinarias en los centros educativos: ¿Suficientes contra el acoso escolar? *Perfiles Educativos*, 36(145), 32-50. <https://bit.ly/37Xd5mw>

b) Libros y capítulos de libro

- **Libros completos:** Cuéllar, J.C., & Moncada-Paredes, M.C. (2014). *El peso de la deuda externa ecuatoriana*. Abya-Yala.
- **Capítulos de libro:** Padilla-Verdugo, J. (2014). La Historia de la Educación desde los enfoques del conocimiento. In E. Loyola (Ed.), *Ciencia, Tecnología y Sociedad (CTS). Miradas desde la Educación Superior en Ecuador* (pp. 107-128). Abya-Yala. <https://bit.ly/3etRnZH>

c) Medios electrónicos

- Aunió, J. (2011, marzo 12). La pérdida de autoridad es un problema de toda la sociedad, no es específico del aula. *El País*. <https://bit.ly/2NIM9Dp>



Normas para epígrafes, tablas y figuras

Los epígrafes del cuerpo del artículo se numerarán en arábigo. Irán sin caja completa de mayúsculas, ni subrayados, ni negritas. La numeración ha de ser como máximo de tres niveles: 1. / 1.1. / 1.1.1. Al final de cada epígrafe numerado se establecerá un retorno de carro.

Las tablas y figuras deben presentarse incorporadas en el texto en Microsoft Word® ubicadas en el sitio en el que los autores consideren que deben estar. Se emplearán únicamente cuando sean necesarias e idóneas, debiendo limitarse su uso por cuestiones de espacios (máximo 6 entre tablas y figuras). Ambas deben ser enumeradas en arábigo y tituladas con la descripción de su contenido. Si la fuente de la tabla o figura no fuera de elaboración propia, los autores deberán incorporar al pie de la tabla o la figura la fuente de la que se extrae [por ejemplo, Source: Romero-Rodríguez (2016, p. 32)].

Las tablas deben estar elaboradas en el propio documento de Microsoft Word®, por lo que no se aceptarán tablas cortadas y pegadas de otros documentos que no puedan ser editados en el proceso de diagramación. Las figuras, además de ser incorporadas en el documento de Microsoft Word®, deberán ser enviadas como material complementario al momento del envío en el OJS de «Alteridad», debiendo tener una calidad superior a 600 dpi, en archivos de tipo TIFF, JPEG o PNG.

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