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Gamified dances, digital and socio-emotional skills in collaborative virtual environments of university students surviving the Covid-19 virus

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The use of virtual dance avatars and virtual learning guides has enabled gamified dance teaching to virtualize the current university. In this experience, the objective was to test four hypotheses about the gamified dance developed in collaborative Zoom environments, and its effects on the digital and socioemotional skills of individuals who were severely or moderately infected by the Covid-19 virus between the years 2020 and 2022. We worked with 119 students and eight teachers from the Professional School of Primary Education of a private university in the city of Lima (Peru). An experimental design with pre and post-test was applied and Likert-type scales were used for data collection. The experience with gamified dances took place over four weeks in a dance competition at the university. The results allow us to assert that gamified dances developed digital skills, emotional skills, as well as socioemotional skills. These skills differ between the experimental group and the control group, with the exception of digital security skills, and the ability to improve self-esteem, which are skills that require more body practice as was achieved in the experimental group (dance virtual), which was also developed in the students of the control group (face-to-face dance).

KEYWORDS

digital ability, gamified dance, interaction at the university, socioemotional learning, infection in students, viruses in university students

1. Introduction

Current educational systems have oriented their management structures towards three types of training at the university: (a) face-to-face, (b) hybrid (semi-face-to-face), and (c) virtual. Systems (b) and (c) have emerged in Education in Peru, disassociating themselves from format (a) in its entirety by 2020, and with much greater practicality for Higher Education to adapt to the social isolation policies dictated by the National Government through Supreme Decree No. 044-2020-PCM (Supreme Decree, 2020). In 2020, this has occurred with the purpose of reducing the infections caused by Covid-19. Likewise, the immunization strategy has been added to avoid infections in the infected and uninfected population in the years 2021, 2022, and 2023. However, Peruvian university students were significantly infected between 2020 and 2021. Its effects led to the interruption of their studies in the first year of the pandemic. Dropout increased from 12.6% in the second half of 2019 to 18.3% in the first half of 2020. For the second semester of

2020, this index decreased, but it was not a statistically significant change (16.2%) (Ministry of Education of Peru, 2021).

By the year 2021, it is known that, until the month of September, 32.15% of the Peruvian population was studying in Peruvian universities in a range of 20 to 40 years of age, of which, only 8, 9% received the second dose of vaccination against SARS-CoV-2 (Cuellar et al., 2021). Even with the immunization carried out by the Ministry of Health of Peru, the infections in the year 2022 continued in force in the university population (although to a lesser extent). It is necessary to know that, in Peru, the population has been immunized with up to four doses, applying more than three types of vaccines (Pfizer-BioNTech, Moderna, Sinopharm...). However, infections still occur for some reasons such as: very small herd effects, population without the complete vaccination scheme (with four or three doses). Consequently, this has caused the virus and its mutations to cause infection in other subjects who have received the full vaccination schedule.

In the year 2022, studies on Covid-19 infection in Peruvian university students are scarce. However, it has been reported that 46.5% of university students have been infected in a public university in Peru (Dextre-Vilchez et al., 2022), even so, 36.63% of said population was vaccinated with only two of the three necessary vaccines to get enough protection. In the capital of Lima, it has been found that 24.9% tested positive for a serological test for Covid-19, likewise, it was reported that 96.4% did not present compatible symptoms of the infection; and 22.2% if they had the full vaccination schedule (López-Reyes et al., 2022). In this sense, since no research was found that demonstrates the social approach of students infected by Covid-19 in education professionals and their involvement in technological tasks and the mastery of digital skills, it manages to contribute to their emotional systems to develop healthy social interactions in the classroom, it is the interest of this research to address a particular didactic situation, with students and teachers infected by SARS-Cov-2; who went through this experience between 2020 and 2022. Therefore, here a cognitive-social-affective experience adapted to the virtuality or gamification of dance is systematized. In this modality of gamification, it is sought to preserve the cultural and traditional meanings of the dances that geographically come from different places in Peru, for which a better cognitive apprehension is predicted in the digitalization in the use of information, as well as to improve the socio-emotional processes in those students affected by cardiac or pulmonary sequelae due to the viral contagion that they presented during the years of pandemic emergency that arose in Peruvian universities. It is important to note that these subjects went through a cycle of social isolation during higher education completed between 2020 and 2021. Therefore, it is believed that personal distancing and psychocognitive conditions expropriated their cognitive and affective development that they presented before graduation. Year of appearance of the pandemic [2020].

Gamification is considered as a massifier of virtual education, due to the professional profile that the student applicant for a teacher must develop today, due to the new forms of social interaction that are required in digital communities. In this sense, it is still important to find evidence that demonstrates the effectiveness of this strategy applied in specific samples, such as university students infected by Covid-19, who show serious and non-serious sequelae, which makes it difficult for them to face various tasks of dance. In this case, it is proposed that virtualized cultural traits differentiated by geographic context will allow the cultural attraction of this type of exhibition, and thus deduce whether the digital conduct of these dances and student participation rehabilitates their technological and emotional skills.

The problem in digital and socio-emotional skills was identified in the context of a private university in the city of Lima, especially in students who demonstrated problems associated with the experience of having gone through a viral infection. It is proposed to intervene the difficulties of face-to-face and digital approach of a group of young people infected by Covid-19 who are students in undergraduate education, with three types of condition: (a) asymptomatic without sequelae, (b) symptomatic without sequelae, and (c) cured with sequelae. Since, together with these difficulties, the collateral effects on digital skills and socio-emotional skills were evident in this atypical sample of students who underwent a gamified dance program. In order to solve the first indications of the problem, it was maintained to ask valid research questions for an applied type study and a qualitative review of the literature, considering the basic substantive theory and those of current support, as well as empirical background which allowed designing a general framework of the literature review.

1.1. Research questions

The bases of the study are centered on the assumption that digital creativity, and collaborative skills developed in virtual environments such as Zoom, Google Meet or other media, are effective in the development of dances, since they are bridges of expressiveness. Digital and improve the receptivity of digital physical education in those who share these spaces (Li et al., 2022; Zulkifli and Danis, 2022). On the other hand, commitment, self-efficacy, and inhibitory control are variables that can be strengthened if they are accompanied by interactive classes in the human student group when they are synchronous (Ratan et al., 2022; Wong et al., 2023). Thus, it is interesting to ask:

Can virtual dance improve, recover or increase the digital skills of students with health difficulties or in recovery after being infected with the Covid-19 virus?

What are the effects of involving the folkloric gamification approach on social and emotional competencies, after integrating into the dance developed synchronously between teachers and students?

What feelings and beliefs emerge towards digital acculturation and folklore emerge after the cooperative experience of gamification?

1.2. Literature review

1.2.1. Digital dance from the folkloric gamification approach

The bases of digital dances are focused on the gamification approach of folklore. Digital dances are understood as activities that allow the use of virtual environments, as well as their digital tools and pathways, which are based on social learning to achieve academic or leisure tasks (Salas-Rueda et al., 2022; Ribosa and Duran, 2023). These dances allow the transfer of cultural and native meanings of a particular context through graphic expression or body movement (Li et al., 2022; Zhao, 2022). Thus, gamified dances allow dance instructors to provide their students with autonomous activities, with which they are motivated and invited towards the organization, systematization and activation of attitudes towards collaborative

artistic expressiveness, with which the students themselves can manage their working conditions, their availability, as well as the implementation of their innovative ideas towards dance (Salas-Rueda et al., 2022).

This perspective is based on the flipped and gamified classroom teaching approach, which allows the teacher to propose to the students to generate their own learning, since they provide the improvement in the search for information, as well as the motivation towards the use of the complex and digital skills with free learning styles, as well as managing the classroom effectively (Durrani et al., 2022; Seufert et al., 2022).

If the reports related to gamification from digital dance are analyzed, the use of technological tools for the digital conservation of culture through cooperative work between the artisan and the virtual designer was found in India (Kolay, 2016). In the area of tourism, gamification has been used to promote environmental care of territorial heritage in Spain (Frías-Jamilena et al., 2022), to search for the intention of tourist permanence in Taiwan (Hsiao and Tang, 2021), and the preservation of cultural significance with the aim of technocapital among students and teachers in the United States (Hamilton et al., 2023). These evidences promote the use of games and augmented reality for the sustainable attraction of the environment for visitors from places that they usually do not frequent, so gamification predicts the sustainable engagement of this type of consumer.

Regarding the use of environments to gamify, the most pertinent research reports that Zoom and TikTok are environments that prevail by favoring commitment to the development of digital knowledge in university students. The truth is that, in Spain, Mexico, the United States and the United Kingdom, it has been discovered that the parallel use of blogs and social networks allows for greater satisfaction and the adoption of capacities to organize digital information and its management (Villalustre and Del Moral, 2015). Likewise, Vizcaíno-Verdú and Abidin (2023), report that the identification of teachers as celebrities on TikTok by students can strengthen the capacities to improve dance modalities, preferential music choices, and follow-up of instructions from the students. In this experience, a greater apprehension of the students towards the teacher was also found, considering it as an image that projects authority, security and flexibility, which occurs in a similar way in students who carry out the same experience on Instagram and YouTube, who end up considering the daily challenges, feedback, and infographics as a means to learn academic content more effectively.

1.2.2. Digital competences: concepts and evidence

According to the traditional concept of gamification, this is understood as the participatory exchange of different motivational actions that imitate the elements and scenarios of video games or natural games, in order to provoke affection towards academic activities in students (Scolari et al., 2018; Dalsgaard et al., 2019; Weidlich and Bastiens, 2019), using leisure patterns, linked to the use of technological tools in daily life. According to this meaning, collaborative gamification stipulates the development of group or individual competition in the classroom game. It has already been proven that gamification can regulate the emotional aspect of the student when seeking to reduce the negative effects of any academic pressure, which has been determined in school performance as in university performance (Kalogiannakis and Papadakis, 2017; Toda et al., 2019; Zumbach et al., 2019).

Digital competences are transitory capacities that are developed in the interaction of the human being with digital environments and the use of technologies. Currently, every professional profile needs these skills that allow the professional to integrate into the virtual community. In many cases it has been found that the interest is minuscule in teachers to train their digital skills, which are trained by curricular requirements (Engen, 2019; Garzón et al., 2020), and others, by constant social interaction in social networks (Aristizabal and Cruz, 2018). In students from Asian universities, who participated in collaboration with their peers with sports software, there was a better development of skills adapted to the DigCompEdu approach, considering the increase in the ability to create digital content, as well as the use of information and security (Zulkifli and Danis, 2022); although it has also been determined that basic and advanced artistic skills are related to the use of technology if native content related to the student's culture is implemented in tasks that involve the use of technology (Li et al., 2022).

In Europe, it has been found that the digitization of information has improved the professional profile of medical students (Pramila-Savukoski et al., 2023). Similarly, in the enjoyment of simulation games with similar samples, positive scores have appeared in variables such as enjoyment, cognitive dominance and positive perception of learning (Antón-Solanas et al., 2022). Regarding dimensional aspects, current evidence refers to levels of learning in special educational and therapeutic professionalization in Spanish-speaking students with different levels (Serrano et al., 2022): novices, explorers, integrators, experts, leaders, and pioneers. Although, in other studies the parameters of the DigCompEdu approach are followed, these have certain divergences with others with similar contexts who evaluate the planning of search strategies, self-efficacy in problem solving and information literacy (Argelagós et al., 2022; Svensson et al., 2022). It is important to accept that the most considered components to be evaluated are directed towards digital literacy, the search for user safety, and problem solving, due to the demands of today's world and professional communities. Among these is the need to use information ethically and with greater scientific-practical rigor.

1.2.3. Socio-emotional competences: concepts and evidence

Emotional competence is the set of skills that identify the human being in its emotional component, which is why it structures its affective traits, expresses its feelings and ideas in interaction with others (Denham et al., 2016). Therefore, the subject structures a certain potential of these abilities in order to establish means of communication that allow him to receive the emotions and meanings of others, evaluate them, as well as issue new responses to those messages (Mayer et al., 2000; Denham et al., 2016). According to studies carried out in Spanish-speaking societies, the emotional model established for Bisquerra and Pérez (2007), is the one that best describes Latin American society, which is why it is linked to the perspective of Salovey and Sluyter in the year 1997 (cited in Bisquerra and Pérez, 2007), therefore they determine the dimensions: (a) cooperation, (b) assertiveness, (c) responsibility, (d) empathy, and (e) self-control (Laghi et al., 2018). Thus, it is also argued that emotional competence is an intrinsic part of social competence (Lavega et al., 2015), since it allows "developing personal relationship and communication skills" (p. 62).

In this sense, socio-emotional competence is understood as the group of capacities that allow the subject to interrelate in a self-regulated way with other subjects in their immediate environment (Bisquerra and Pérez, 2007; Lavega et al., 2015; Denham et al., 2016).

The self-regulation of the human being reaches its maturity as he begins to experience new situations (Mayer et al., 2000; Schoon, 2021), which strengthen his intrapersonal and interpersonal intelligence. The socialization competence or socio-emotional competence regulates the subject's behavior as soon as it achieves its development, establishes its way of life, conditions its attitudes towards various situations, or improves the quality of its communication. This formalization of social competence is carried out in the university. In other educational contexts, emotional skills are related to social motivations which materialize as extrinsic events; likewise, social awareness, inhibitory control and self-regulation of social relationships are valid in the face of this type of extrinsic motivations (Tam et al., 2021; Wong et al., 2023).

However, in the social environment of development of university students, emotional competence and social competence are certainly indivisible in the interaction with other subjects. Social learning involves using emotional skills that allow coexistence. In this regard, studies report that students in Spain can develop their social skills according to the collaboration they have to understand the processes and results that anticipate the performance of group tasks (Ribosa and Duran, 2023). In turn, this type of activity in China improves diagnostic and reflection learning when the inquiry activities are group (Wu, 2023). This efficiency can also be found in group games or sports developed through gamification with applications and video games with qualified athletes or novice athletes (Keeney et al., 2019; Huang et al., 2022); and in environments such as Zoom, it has been found that cooperative learning in digital media can be more effective and positive than face-to-face learning (Mǿgelvang et al., 2023). The synchrony of virtual classes can present better effects in university students who have the company of the teacher in the virtual classroom (Ratan et al., 2022), for this reason, the teacher's mediating factor is inseparable from fun and collaborative teaching.

It has been found that the interaction between subjects from different contexts can increase self-control and decision-making in teachers who often experience the role of students (Llorent et al., 2020). Similarly, students who share more rewarding activities in sports and art tend to have better emotional abilities to express themselves in social groups (Ulupinar et al., 2019; Ribosa and Duran, 2023). On the other hand, it must be accepted that there is evidence with conflicting results to those already described, where it is assumed that digital communication hinders the lack of expression of negative experiences (Sjǿlie et al., 2022), as well as less social collaboration in student groups. Who do not use social networks in Norway, and in some groups in China in which, if they do, making it impossible to achieve their learning objectives (Zhou et al., 2023). This point is important for research, since it allows us to understand the limitations of some type of failed interactivity in groups that are not predisposed, much more so in the activity of dance, the realization of which requires many social interrelations. Here the effects of digital dance are considered as another starting point to outline the generation of emotionality and social skills in university education students.

1.3. Hypothesis approach

1.3.1. Gamified digital dance and digital skills

According to Li et al. [6], seeks to apply gamified strategies of virtual dance, in order to establish digital expressiveness as a means of immersive and collaborative physical education, considering that ideas and dance execution can be developed through the application of creativity, self-regulation and collaboration. Therefore, these strategies are adapted here, adding the cultural contextualization of coastal and high Andean dances, so that through their customs, digital skills are developed indirectly in virtual media. The application of activities is based on the experience with digital content extracted as Peruvian folklore content. In this sense, it is sought when using avatars or real teachers in virtuality, as in studies that seek to improve musculoskeletal aspects of the human body in virtual movement with academic guides (Zhao, 2022). Evidence has shown that better articulation in the body can be generated and postural position corrected, which can be done in environments that require the use of complex digital skills (Durrani et al., 2022; Zhao, 2022); as well as when applying the inverted classes approach (Durrani et al., 2022). The execution of digital dance through virtual activities supports the use of information as a means of gamification and feedback of digital skills. For all of the above, it is postulated:

> *H1:* Dance performed collaboratively with the inverted class approach and in gamified virtual environments compared to dance developed with face-to-face instructional classes, implements better digital skills in university students who have been infected with the Covid-19 virus.

> *H2:* The execution of digital dance compared between the groups included in the study, allows the increase of literacy and collaboration skills, digital content creation, digital security, and digital problem solving.

1.3.2. Gamified digital dance and socio-emotional skills

The evidence from Wong et al. (2023) outline part of the bases of this study, since they found that the development of classes in the Zoom virtual environment favors the achievement of commitment and the predictive power of self-efficacy in students who carried out remote education activities. In this sense, we apply this methodology including the use of the acculturation of virtual environments through dance, for which it is believed that better emotional ties and more interactive social relationships are generated in students with certain physical deficiencies for motor expression, due to the consequences of contracting Covid-19. For this reason, it is considered crucial that physical interactions are mediated through virtual interactions and thus generate cognitive savings and displacement in subjects who obviously, with sequelae, cannot achieve distinctive competencies, due to the rejection and overexertion that the application can cause. Face of this strategy. In-depth exploitation studies of verbal interaction are added to this approach, since they allow the improvement of collaboratively produced digital products (Ribosa and Duran, 2023). Consequently, it is understood that, given the self-efficacy generated in students with similar biological and social characteristics, social awareness and self-management of human relations can be exploited (Toh and Kirschner, 2023), even more so if they are carried out with teachers who can guide their students, virtually in synchronous classes (Ratan et al., 2022):

H3: Virtual dance, collaboratively executed with an inverted and gamified teaching methodology, promotes better socio-emotional skills in university students infected with Covid-19, unlike those who perform it with an instructional approach in person.

H4: Virtual, collaborative and gamified dance, compared in the experimental group, can be significantly more positive for the socio-emotional states of students infected with Covid-19 (with and without sequelae).

2. Materials and methods

2.1. Design and study

The approach adopted for the investigation presents two aspects: (a) quantitative, hypothetical deductive and (b) qualitative, analytical interpretive. Therefore, three phases of study are presented, which allow comparing the experimental effects proposed by the folklore gamification approach, as well as the understanding of affectivity and beliefs developed in education students in their pregraduate training. In this sense, the research proposes three phases of study: (1) Determine the effects of dance as a digital gamifier in virtual environments on digital skills, (2) Compare the effects of gamified dance with collaborative virtual environments on socio-emotional skills, and (3) Interpret the affections and beliefs of students and teachers who participate in gamified dance in collaborative virtual environments.

2.2. Participants

The investigation addressed the case of a private university in the city of Lima in Peru. 119 students participated who were infected at least once with the Covid-19 virus between the years 2020, 2021 and 2022, as well as those who became infected again in that period. The students were selected from a total of 879 students enrolled until the first semester of 2022 at the Professional School of Primary Education. All were applicants for a degree in education and teacher for the primary stage or level in the Regular Basic Education of Peru [serving students from 6 to 11 years of age], with multiple specializations in the curricular areas of communication, science and technology, mathematics, personal social, artistic and religious education. For the sampling, the vaccination identifications issued in the year 2020 to the Peruvian population were collected. In this case, the stamps and vaccination signatures registered in each identification of the Ministry of Health of Peru were verified. The cards had to register at least three or four stamps of the vaccines obtained by the university student: Sinopharm, Moderna, Pfizer, J&J..., in order to standardize the defenses that the subjects of the experimental group and the control group would have.

In the first 3 months of 2022, a figure of less than 70% of vaccination was verified in young people between 18 and 59 years of age according to the Covid-19 Vaccine portal, which was registered in advance by the Ministry of Health: https://www.minsa.gob.pe/reunis/data/vacunas-covid19.asp. It should be noted that this portal is renewed weekly. Since the fourth vaccination dose would be inoculated to the population in mid-2022, it was decided to carry out the study in the months of September, October, November and December of the same year. Once the figures for the vaccination scheme required by the Ministry of Health for the return to face-to-face or blended attendance were completed, it was possible to complement the comparison groups according to the capacity of the classrooms, trying to become as equitable in terms of the distribution of participation places (Experimental Group = 61; Control Group = 58). Students added to both groups had three [9%] and up to four [91%] doses. The distribution of the individuals was carried out seeking the greatest possible equitability for each group.

Regarding the mean age, this differed, the experimental group being older (M = 29.5; SD. = 1.07) compared to the control group (M = 26.3; SD. = 1.27). In the experimental group, the digital dance methodology based on the folkloric gamification approach was applied, and in the control group personalized dance classes were worked on during the first month of work. All the activities were carried out within the framework of the dance and dance contest: "*Show your Talent*" from the professional school. This type of sampling was non-probabilistic with convenience criteria for the study. The selectivity criteria were: (a) Go through an infection at least during the pandemic period (2020–2022), (b) Demonstrate first-degree or basic sequelae, proven by those of a pulmonary, osteomuscular, neurological, cardiac type; and mixed (Goicochea et al., 2022), (c) dropout [in at least one semester], and (d) proven absence [in at least one subject].

Four teachers were assigned to each group (experimental and control). Regarding the doses acquired by the students, there was a higher degree of inoculation in subjects with the fourth dose (third dose = 11; fourth dose = 108). The age of the teachers in the experimental group (M = 49.3; SD. = 1.53) and the control group (M = 48.1; SD. = 1.37) did not present very pronounced differences between them. Regarding gender, the female type was higher (65%). The same occurred in the group of teachers (75%). It should be noted that both groups were monitored by two specialist health professionals for each group (doctor and nurse). These were assigned by the occupational health and safety area of the receiving university.

It should be noted that the execution of the study was carried out after obtaining the approval of the ethics committee of the faculty of the investigated university. Once the corresponding permits were obtained, the subjects were consulted about their participation so that they were included in the contest as a central activity of their professional career studies. As a consequence, the consent of each of the participating subjects was obtained in full.

2.3. Instruments

In the investigation, three study phases were considered, for which questionnaires and scales were used in order to evaluate the variables involved. In order to measure the digital competences in the students applying for a teacher, the Questionnaire to measure the digital teaching competence of Tourón et al. (2018), whose scale with 54 items made it possible to measure the dimensions: (a) information and information literacy, (b) communication and collaboration, (c) creation of digital content, (d) digital security, and (e) resolution of issues. On the other hand, when considering the socio-emotional

competencies variable, a broad construct, with double meaning and structure in the current literature, it was decided to use two instruments to measure these competencies at the university: (a) emotional skills and (b) socio-emotional skills.

In this sense, two questionnaires were used. To measure the first component, the Adult Emotional Development Questionnaire (Pérez-Escoda et al., 2010) was applied, and for the second, the SocioEmotional Learning Skills Scale (Ulupinar et al., 2019). Each instrument evaluated the dimensions corresponding to socio-emotional competence (Table 1). For the evaluation of these research materials, they were submitted to the opinion of five experts in the areas of educational psychology, education, linguistics and writing. The indicators were proposed: linguistic adequacy, item-construct relationship, relevance. The acceptance rates were in the range of 99.45 and 99.71%. However, the syntactic and semantic adaptation recommendations for the target audience were taken into account.

Once the adaptations were resolved, the instruments were applied to the students who were not in the Covid-19 contagion risk group, and who complied with the vaccination schedule with the third and fourth doses. In this case, a random sampling by conglomerates was carried out to distribute the instruments to a total of 120 subjects of the total number of students left over from the Professional Career of primary education. All the instruments presented acceptable indices for their application (Table 1). For greater security, we proceeded to calculate a test-subtest type correlation for this analysis and test the membership of the components by means of a statistical calculation. Finally, teachers and students interested in providing answers about their experience were interviewed, in order to assess the affections and attitudes towards folkloric gamification.

2.4. Procedure

Digital dances as a method of gamification are activities proposed to address three formative aspects in the university: (a) acculturation, (b) academic organization, and (c) creativity. In this sense, acculturation allows students to acquire new knowledge from the development of autonomous activities based on inverted teaching methodologies (Durrani et al., 2022). Regarding the academic organization, collaborative work predicts academic engagement, as well as the use of guides in virtual environments such as Zoom (Zhao, 2022; Wong et al., 2023). Finally, free academic tasks are applied that allow greater expression of art and cultural expression in digital environments (Li et al., 2022).

In this sense, the learning program was developed in the experimental group for 4 months, and thus form teams that participate in the contest organized by the Professional School of Primary Education which had a similar duration (*Show your Talent*) (Figure 1). The first month consisted of the application of cultural inquiry classes, that is, inquiring into the origin of the dance or the dance with which they would participate throughout the contest, as well as the language or native language used in the chosen dance (Figure 2). The other months were used to organize through Zoom and other platforms such as WhatsApp video calls, multimedia messaging, as well as video recordings recorded on YouTube. Each group was independent to use their media to interact with the teachers assigned to each class. Many of them used YouTube channels to present tutorial videos to review the dance steps at home, the students used this medium to provide feedback on physical activity. The teaching classes were developed at the same time as the dance contest, as well as its predecessor activities.

All the students knew that the presentation would take place through the Zoom environment (Figures 1, 2). This was controlled by a host and two or three co-hosts (Professional School teachers). The artistic numbers were presented weekly, simulating a composition of qualifying levels based on the World Cup scheme. Each dance or dance would have a duration of 5 to 10 minutes according to their choice, and their execution could vary according to the region from which the dance came, however, they could not choose the same dance in subsequent participations in the contest. Beginning with the round of 16 phase, teachers would be able to interact in each team's Zoom groups at all meetings. At the beginning they could only enter the room to provide specific advice (without additional recommendations or pedagogies). This in order to generate effects on autonomy and digital organization.

The sending of messages in the Zoom chat, the use of Emoticons was allowed; as well as the reproduction of YouTube videos. However, following the recommendation of the qualifying jury, the use of emoticons in the official presentations was not allowed to prevent impressing the evaluators in the official transmission of the dance. The juries were dance instructors or dance teachers in the subjects of Dance and Culture, Talent Management and Ludomotricity; who did not know the aspects of the dances to be performed in each week of participation. All the judges used puppets and pseudonyms to express themselves after each dance performance, and thus provide their comments (Figure 1).

The students integrated into the control group carried out similar activities with the exception of carrying them out in person in the recreational patios of the university, conference rooms or mini-theatres. Only those who became infected along the way were allowed to participate in the digital contest, without having serious sequelae that affect their participation. The evaluations with the questionnaires described were applied in the month of August (pretest evaluation), and at the end of December as a posttest evaluation. This allowed the scores obtained to be compared.

TABLE 1 Components, indices and instrumental correlations.

Variable	Dimensions	Indices	*r**
Digital competences[a]	Information and information literacy	9.70	0.93
	Communication and collaboration	9.89	0.97
	Creation and digital content	9.72	0.91
	Digital security	9.71	0.96
	Problem resolution	9.78	0.94
Socioemotional competences[b]	Emotional skills	9.75	0.96
	Socioemotional skills	9.71	0.91

a = 9.73; b = 9.86; *$p < 0.01$.

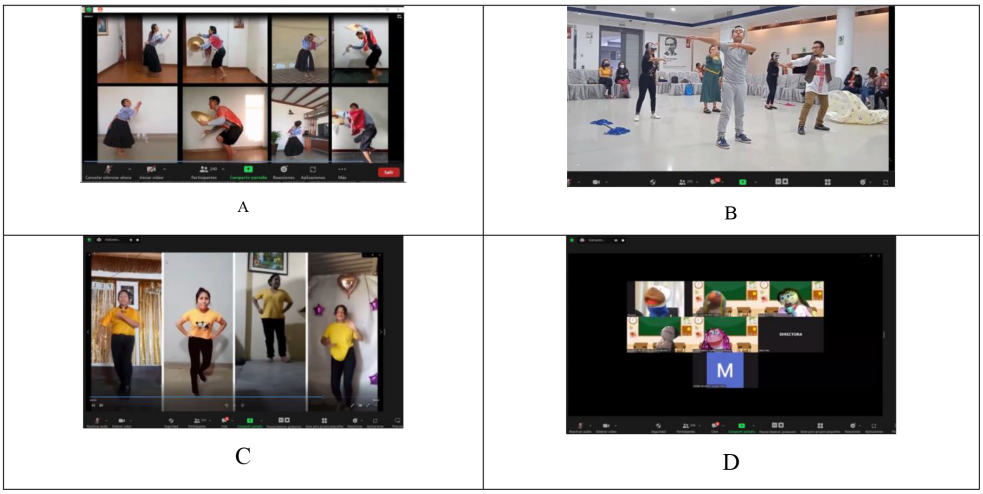

FIGURE 1
Dances, dance, and judges activities of the contest "*Show your Talent*". **(A)** *Dance*: Marinera norteña; **(B)** *Dance*: Tumbaó; **(C)** *Dance*: Negroide; **(D)** Judges in verdict session.

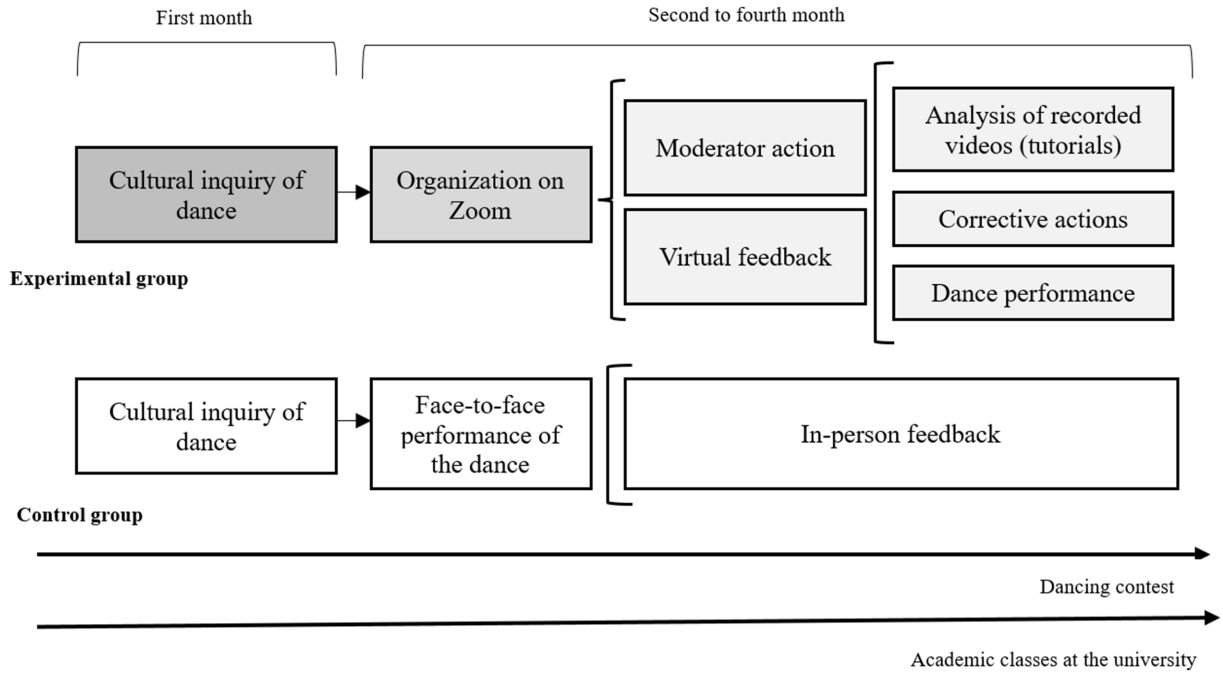

FIGURE 2
Temporality of the contest and didactic phases in the compared groups.

Regarding the analysis, once the data was collected, the post-test measurement was tabulated in a matrix of the IBM SPSS 25 program, through which its normality and statistical adequacy could be contrasted. In a first discussion between the authors, the decision was made to analyze them with non-parametric statistical tests due to the sampling carried out, the accounting and qualitative characteristics of the sample under determination. In a second discussion, it was decided to submit the scores to the Kolmogorov–Smirnov and Shapiro–Wilk tests, and thus prove convergences on the results to be obtained. The data confirmed that the contrast information did not come from a normal distribution, so the Mann Whitney and Wilcoxon tests for independent samples were used. Finally, the group of researchers decided to apply parallel *t*-Student and independent *t*-Student tests in order to ensure that the results were similar in both non-parametric and parametric statistics. This is in order to report results with the certainty that the contrasts in the pretest and posttest measurements behave as incorruptible or are invalidated by biases in the use of the chosen statistic.

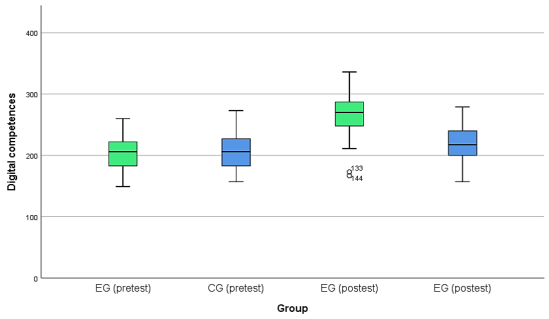

FIGURE 3
Pretest and posttest comparison in digital competences.

3. Results

3.1. Gamified digital dance and digital skills

According to the first hypothesis (*H1*), the scores in digital skills before carrying out the contest with gamified dances were compared (pretest evaluation), which allowed finding similarities between the control group and the experimental group (Figure 3).

The pretest scores obtained in each group were similar, without presenting traces of significant differences ($Mdn = 206.00$; $p > 0.05$). The results after the executed contest showed favorable indices to the experimental group with a difference greater than 50 points between the calculated medians ($Mdn = 270.00$; $p < 0.05$). Figure 3 shows a higher median value in the experimental group than in the control group, the average score was higher for the experimental group ($X = 265.57$). A study of averages ended up confirming the hypothesis initially raised, since the gamified dance developed by university students in the Zoom virtual environment is more effective than its face-to-face execution. For this reason, the digital competences were strengthened in the experimental group, from which it can be deduced that the search for information developed in the individuals of this group, as well as their ability to communicate repeatedly in the environments of Zoom, YouTube and WhatsApp, has deployed the competencies to inquire into the cultural information of each typical dance, share the characteristics of each context in these media, therefore, the stages of inquiry and informational organization of the contest have been directly influential in this variable.

Due to the second hypothesis (*H2*), it was proposed that digital skills be developed in university students after developing the dance and dance contest. In this sense, the average scores in the pretest measurements did not present significant differences in any of the skills (Information and information literacy $_{(diff.)} = 0.19$; Communication and collaboration $_{(diff.)} = 0.06$; creation of digital content $_{(diff.)} = 0.34$; digital security $_{(diff.)} = 2.33$; problem resolution $_{(diff.)} = 5.68$; $p > 0.05$) (Figure 4).

According to Figure 4, differences were found between the post-test scores calculated between the comparison groups, which were favorable to the experimental group (Information and information literacy $_{(diff.)} = 10.19$; creation of digital content $_{(diff.)} = 6.53$; problem resolution $_{(diff.)} = 16.87$; $p < 0.05$). However, non-significant differences were found in the dimensions linked to communication skills and digital security (Communication and collaboration $_{(diff.)} = 3.68$; digital security $_{(diff.)} = 5.24$; $p > 0.05$). Although these differences were favorable to the experimental group, the lack of significance indices was verified using non-parametric analysis methods (Communication and collaboration $_{(U)} = 1434.000$; digital security $_{(U)} = 1443.000$; $p > 0.05$). The results that contribute to the approval of the hypothesis about these abilities, can demonstrate that the phase of the organization of the dances in the contest, as well as the feedback aspects submitted to the contestants to expose their common ideas, weaknesses or strengths, indicated in WhatsApp group conversations, or with the analysis of video recordings of dance practices in the Zoom environment. The skills to share this information, to know how to discuss, as well as to analyze and reward the results of the dance through comments, have developed the capacity for collaboration and digital problem solving. Many of the subjects participating in the virtual dances searched for means with which to interview and learn more about the customary contents that each dance represented, as well as to execute specific steps, which after a group analysis, the results allowed them to solve problems related to interconnectivity, socialization and active listening. The role of the moderator was also crucial in the development of these activities since it influenced the corrective actions on the weaknesses demonstrated in the practice of dance.

3.2. Gamified digital dance and socio-emotional skills

Regarding the verification of the effects of gamified dance in virtual environments on socio-emotional competencies, the construct was calculated from the analysis of emotional competencies, as well as socio-emotional skills. Regarding emotional competencies (Figure 5), no significant differences were found in the comparison of the pretest measurement, although the median was higher for the experimental group ($Mdn = 361.00$; $p > 0.05$). As can be seen, the median of this group is positioned in a location of higher scores than those of the control group. In this sense, the median of the group of students who performed gamified dances was higher than that of the control group, and the difference showed signs that these changes were statistically significant ($Mdn = 425.00$; $p < 0.05$).

Regarding the evaluation of socio-emotional skills, the comparison of the pretest measures presented stability and statistical homologation with each other, since the differences were not significant ($Mdn = 94.50$; $p > 0.05$). In this case, the difference between medians was favorable to the control group. A comparative analysis of average measurements made it possible to verify the absence of differences with parametric tests ($X_{(diff.)} = 1.5$; $p > 0.05$). In summary, both groups started the activities with similar socio-emotional skills.

Regarding the comparisons of the scores obtained by the participating groups after the development of the "*Show your Talent*" contest, significant differences were found in the emotional competencies with the highest median obtained by the subjects who participated in the gamified dance ($Mdn = 425.00$; $p < 0.05$) (Figure 4). In the same way, favorable differences were obtained for this group in terms of the development of socio-emotional skills compared to those of the control group ($Mdn = 122.00$). These differences were significant ($U = 517.500$; $p < 0.05$). Given these results, it was considered to approve hypothesis *H3*. This allows us to infer the effects transferred in the face-to-face virtual interaction performed by the students in the gamified dance program. The emotions were adjusted to the climate of the virtual classroom in which the main activities were developed,

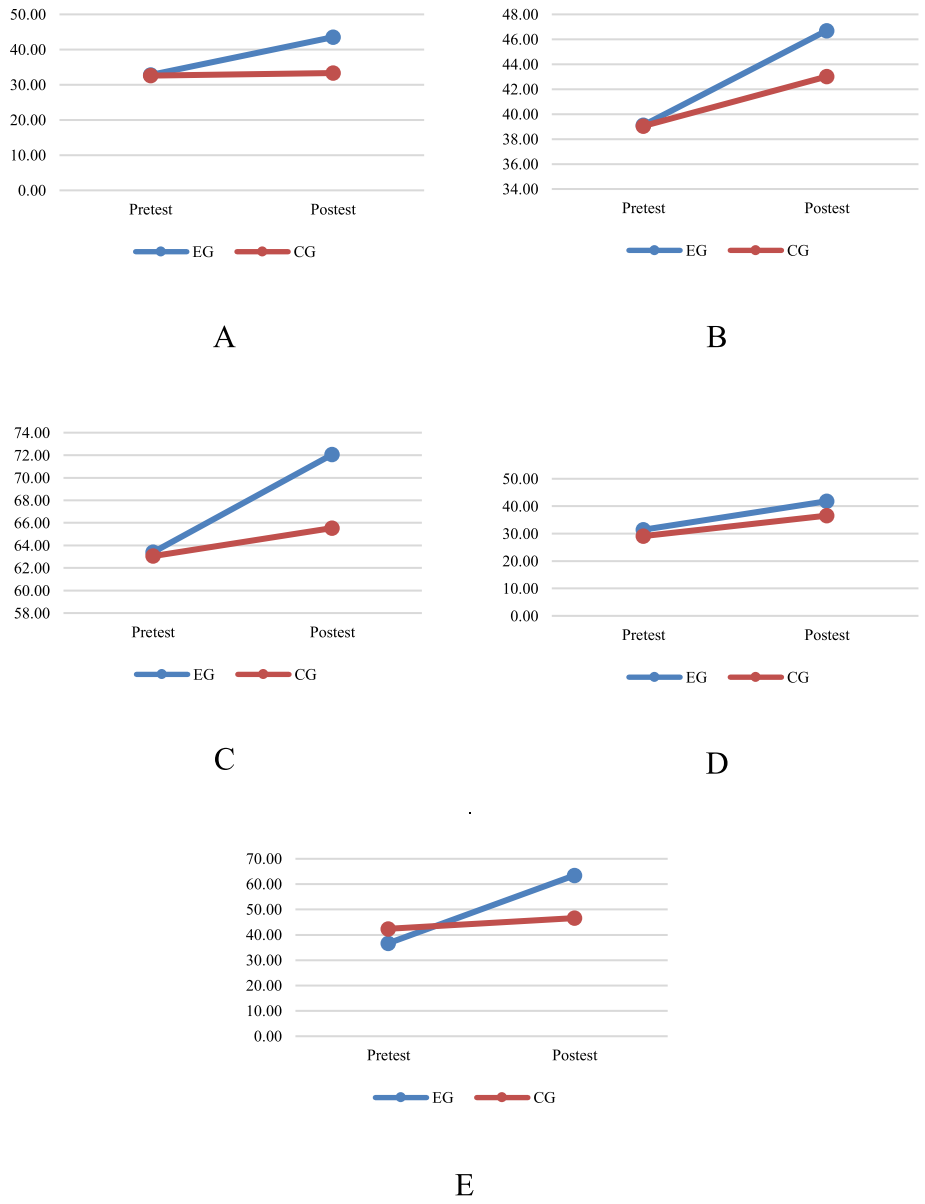

FIGURE 4
Comparisons in average scores of digital skills. **(A)** Information and information literacy. **(B)** Communication and collaboration. **(C)** Creation of digital content. **(D)** Digital security. **(E)** Problem resolution.

such as the proposition of the debate in the review of recorded videos of the practices, or the progressive execution of the dances, perfecting and equipping the dancers with social interaction skills advanced. The phases of development, evaluation and feedback of the program managed to increase the desire for interaction that the subjects had who were withdrawn in their communicative activities. This has been denoted with greater specificity in students who dropped out in a semester in which the pandemic affected their physical and attitudinal development or their attitudes.

Table 2 reports the pretest and posttest data for socio-emotional skills. From these data, non-significant differences can be inferred in all the pretest comparisons in all the skills, with the maximum rate allowed being 5%. Therefore, both groups were declared to have similar abilities. At the end of the post-test evaluation, the data was compared, obtaining results with a better tendency to improve problem-solving skills, overcoming stress, as well as communication skills. The scores were favorable for the experimental group; whose differences were significant. On the other hand, there were improvements in the ability to improve self-esteem in both groups, in turn, these scores differed without the statistical test index being significant ($U = 1568.500$; $p > 0.05$). However, the fourth hypothesis (*H4*) was considered true. Given this, it can be asserted that gamified dances contributed to the development of communication, in principle, due to the interactionism factor generated by the dance program and the contest when the students came to the need to engage in conversations and debates about the practices carried out. On the other hand, the students managed to stabilize their self-esteem in interactions with other young people who had similar experiences, since the reflection of these vicissitudes described in their conversations premeditated a greater self-assessment of their own life.

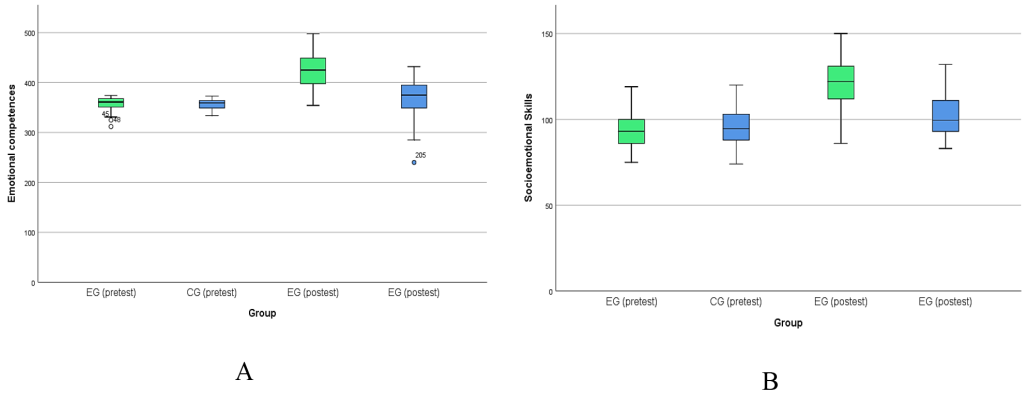

FIGURE 5
Pretest and posttest comparison in emotional competencies and socio-emotional skills. **(A)** Emotional competences. **(B)** Socioemotional skills.

TABLE 2 Intergroup medians of socioemotional skills.

Skills (group)	Pretest*	Posttest**
Solve problems (EG)	18.00	31.00
Solve problems (CG)	21.00	21.00
Overcoming stress (EG)	19.00	30.00
Overcoming stress (CG)	22.00	22.00
Improve self-esteem (EG)	24.00	31.00(*)
Improve self-esteem (CG)	23.00	30.00(*)
Communication (EG)	22.00	33.00
Communication (CG)	22.00	27.00

*$p > 0.05$; **$p < 0.05$.

As well as in group participation to achieve the goals of the project in which they participated. The dance activities also dissipated the difficulties in their own academic work, so it is assumed that the stress reduction in these subjects by participating in the dance contest is assumed.

3.3. Affection and attitudes towards folkloric gamification

Regarding the affectivity towards folkloric gamification, 50 students from the experimental group were surveyed, and four teachers who were mediating leaders of this group, who also presented Covid-19 infection during the pandemic period. When asked: -How did you feel about the experience? What feelings have the dances in which you participated via Zoom aroused in you?- Concepts such as: happiness, joy, effort, resistance, adaptation, benevolence, collaboration, and distraction were separated from the synthesis of the responses. Many of the participants described the dance of the Zoom environment as a "*very relevant artistic option to express ideas and cultural meanings*" (Mery, 28 years old). They also described it as an activity of: "original dissemination of ancestral life" (Carlo, 31 years old); which complements other opinions where it is reported as: "distracting activity, which helps to dissipate stress" (Carmen, 30 years old). Many of them emphasized that the gamified activity, apart from being fun, promotes communication and collaboration between the participants who did not know each other, because they belong to other classrooms, or from different semesters, which they describe as a connective and supportive experience. In these sentences, the young people report that the Zoom environment and other virtual media managed to make physical activity allow them to adapt to their biological possibilities without demanding more than necessary from themselves as in a face-to-face activity.

On the other hand, 40 students from the control group and the four teachers who guided the group in the face-to-face dance contest were interviewed. In this sense, they responded that dance is: "*a very gratifying activity, but it takes a lot of time to organize, talk and discuss the important themes of each dance*" (Casey, 29 years old). On the other hand, the reported feelings showed: joy, satisfaction, effort, doubt, retribution. Some of them expressed surprise at participating in the contest in its virtual format: "*I would like to have participated in the other experience, it seems a bit rich to help us be more creative than in a square*" (Michael, 26 years old). In this sense, some demonstrated the need to do recorded dances or live broadcast, because the physical environments required more space and organization.

Due to the attitudes in the experimental group, it was questioned: -How do you consider that the type of gamified dance contributed to your physical and professional development? -, the students participating in the contest mentioned that the activity as such allowed them to adapt their efforts towards its physical possibilities. Some of them who had respiratory problems or sequelae from the infection that they overcame mentioned that gamified dance was an activity that helped them breathe better, remove stress; and organize their practices without suddenly putting them off. Another question aimed at evaluating the attitude towards gamified dance was raised: -would you recommend this practice to disadvantaged groups with physical disabilities like yours? -; Many of them answered that they would, including themselves as possible participants if requested in any academic or non-academic activity, but they recommended that this be extended to the curricular activities that are usually carried out at the university.

Finally, at the request of the subjects of the control group, who wanted to participate in the digital dance contest, another experience was scheduled, which will take place in mid-2023. This will allow comparisons to be made close to the control of experimental groups, and the complementary variables of this research.

4. Discussion

The objective of the investigation allowed to propose the hypotheses to be studied. Thus, the results obtained initially allowed us to declare the effectiveness of the gamified dance developed collaboratively in Zoom environments, and its positive influence on digital skills and socio-emotional skills; compared to those who perform traditional dance in its face-to-face format. Regarding digital skills, the groups started the methodological route with similar scores to each other; and subsequently, the effects of gamified dance were described with greater emphasis on digital problem solving competence and information capacity and information literacy. In this sense, the contributions of the acculturation, academic organization and creativity phases are confirmed, from what authors who report a higher level of creativity, collaboration skills and preparation propose (Durrani et al., 2022; Li et al., 2022). However, it should be noted that feedback in dance articulation and posture, as established by another study in China (Zhao, 2022), was not corroborated in this study, but the importance of the achievement of verbal feedback in the young people of the university contest should be accepted, who used digital media such as Zoom, WhatsApp or YouTube.

This is opposite to what was found by Durrani et al. (2022), which mentions that the interactive questions between the moderator and the presenter are important to generate motivation and complex knowledge in virtual learning platforms similar to those used in this study (Zoom). Given this, the results found in this part of the investigation have revealed the predisposition of students to follow better quality structured steps when frequencies of control and reflexivity are provoked in dance or physical activity tasks when other subjects govern and direct dance acts (Villalustre and Del Moral, 2015; Kolay, 2016; Castillo-Bravo et al., 2022; Huang et al., 2022; Li et al., 2022; Toh and Kirschner, 2023; Wu, 2023). But they gradually provide autonomy to the student according to the challenges that arise in the activity (Durrani et al., 2022; Wu, 2023). This was evidenced in the teachers who directed the practice of virtual cultural dance with "*openness*" and those teachers who directed the dance contest in a gamified way. This allowed incurring in the development of skills to socialize more independently, with greater confidence, and playful distracting aspects when interacting through dance and dance games. It is inevitable to refute that the effects caused by the unilateral application of the flipped classroom are minuscule when academic objectives are sought. The crucial part of this research focused on contextualizing the flipped classroom with existing cultural models in regions with which the participants sympathize, characterizing it with total freedom by the students based on their proposals and creativity.

On the other hand, it should be noted the influence of the use of interaction and academic leisure platforms that were used as intercommunication objects in addition to Zoom (Youtube, WhatsApp...). His influence has been due to the abilities of enjoyment, creative thinking and analytical receptivity that the subjects of the experimental group have developed, as has also been postulated in other studies (Antón-Solanas et al., 2022; Zulkifli and Danis, 2022). In addition, the subjects were able to develop digital skills to collect, transfer, and analyze information before preparing to organize a dance, include their cultural traits previously researched on the Internet, and perform the steps rigorously in order to win the competition.

It is crucial to note that digital security and communication were complex digital skills to develop in both methodological groups, although without finding differences, it can be pointed out that there were intragroup effects. That is, the average or median scores compared in each pretest and posttest measurement of each group were significant, therefore, this would corroborate that the inverted classes included as part of the intervened group, as well as the motivation towards the use of creativity were variable. Implicit that stimulated digital dance, which is reported by other authors (Durrani et al., 2022).

Due to the emotional competencies, positive effects were found in their development, therefore, it is verified that the presence of the teacher generates a more positive perception in the students when they become social guides of the class (Ratan et al., 2022). The emotional and communicative abilities of the students participating in the contest have improved thanks to the verbal interactions that the students were already developing in the stage of social isolation due to Covid-19 (Ribosa and Duran, 2023). The effects were satisfactory in most socio-emotional skills, due to the self-management of relationships, the development of social awareness, and the commitment shown by the students when participating in the contest activities, which was argued in other studies that based the hypotheses of the study (Toh and Kirschner, 2023; Wong et al., 2023). It is necessary to note that the ability to improve self-esteem did not differ from the abilities of those subjects who danced in person, however, the intergroup effect was greater in terms of the medians reached. This helped in describing the effects of improvement in the experimental group, although these were not statistically better than the effects of the control group.

Regarding the bodily and interactive physical domain, it is necessary to understand that the physical activities that use digital media in conferences, talks, and sports activities predispose well-being and cooperative learning (Ulupinar et al., 2019; Sjølie et al., 2022; Mølgelvang et al., 2023). Thus, in this research the application of this type of activities was carried out appealing to mutual support between peers in virtual environments. In this sense, certain affective and social characteristics have been achieved in the experimental group: (a) emotional well-being in the organization of dances, (b) expository explanation of the leaders about the content of the dances, (c) security in the expression cooperative, and (d) organization and approach to competitive goals. It is true that current evidence has discriminated the empowerment of students' motivation in value of achievement goals, in the case of the research carried out, the proposal of dance mediators has been used, who were teachers who went through the same infection as the dancers; and this has modified the central objective of preparing for the dance contest, turning it into a parallel objective of fun and leisure, which intrinsically developed affective bonds between these participants.

Approving this part to what was found by Llorent et al. (2020), decision-making, self-knowledge and social awareness have also been involved in the teachers participating in this experience, since they have directed the group of dancers who shared their experiences related to Covid-19 and how to overcome the consequences to improve their dance styles, their attitudinal and affective predisposition towards the proposed goals. According to Toh and Kirschner (2023), other activities can be proposed that stimulate inhibitory control in students who perform gamified dances such as face-to-face dances, since it is proposed that students with better levels to inhibit properly distracting behaviors in the effort academic, they can participate in more occasions in each dance. Although, it is necessary to consider

that this pedagogy must begin with basic representations that help them develop in common at their comfort in virtual scenes. Regarding the scientific contribution, the results allow us to accept the gamification of dance as a basic, organizing, creative, and self-regulating playful activity when it is implemented as a didactic for academic autonomy. In this sense, from the perspective of physical education, it allows the comprehensive development of the social, cognitive and attitudinal aspects. For this reason, it is necessary to avoid determining this practice as the only motivational activity guided by the theme of video games, since it can be adapted to educational situations, and even to the clinical context.

5. Conclusion

The verified hypotheses allow us to assert that gamified dances provide cultural, contextual, historical-academic information among the participants who perform them collaboratively. In this study it was possible to determine that the gamification of dance in virtual environments such as Zoom, can be as effective or more than traditional dance. It is concluded that the digital skills and the socio-emotional skills of the subjects infected by Covid-19 developed positively, without the need to print the directive teaching stereotypes that teachers can project towards students. Thus, from the strategies that sought to influence autonomy, control of emotions and the application of creativity exposed through the inverted class model; digital communication skills, information search, problem solving, commitment, communication and improvement of self-esteem were developed in students with few possibilities of physical effort due to the sequelae they had.

According to the first hypothesis, it can be affirmed that collaborative dance in its virtual format applied through inverted format classes with creativity stimuli allowed the individuals in the sample to strengthen their technological capabilities or digital skills, due to the autonomous organization that groups generated by applying certain dances, due to the interaction that was increased in this organization among its members. In the same way, according to the second hypothesis, this format of culturization of the dance allowed to bring the dancers closer to the customs and contextual and geographical experiences through the literary investigation, for the same reason, the creative, literacy, communication and problem-solving skills. Problems increased due to the contextualization activities carried out by the subjects who participated in the contest.

Due to the third hypothesis, the competencies with an inverted format in collaborative dance, have represented the improvement of the communicative and instructional quality of the individuals who developed some type of dance adapting to the cognitive interaction with other subjects; and the virtual approach to the body organized through the digital practice of the dances themselves. In relation to the fourth hypothesis, the intergroup comparison has been more successful than in the groups of students who developed it physically, therefore, some factors such as stress and low self-esteem, which affect the socialization of students, were overcome. With problems related to Covid-19. Apparently, developed by communication and interactions as dimensions also addressed in the experiment. It is important to carry out a subsequent study based on similar methodological processes, with the lengthening of the temporality for the development of this contest, in turn, to seek the comparison of another experimental group [without sequelae] and see what is the behavior between the three groups according to this proposal. It is logical that, in order to verify any hypothesis raised from this experience, a comparison of variances and a structural analysis of the effects are necessary. In the collection of information, it is also necessary to record other psychological and biological aspects of the dance, such as proximity, posture and physical performance.

The limitations of the study allow us to recommend the use of this experience in different learning contexts at the university. The dance contest supported by the use of technology can motivate students to find new ways to develop creativity, strengthen study habits, and enhance social and emotional skills. This motivation can be generated among students who do not know each other, and who even suffered from some clinical affectation during their formative process. Finally, it is important to propose the virtual practice of dance in the execution of the annual curricular programming of public universities in vulnerable contexts, in whose classrooms the socioeconomic profiles of students differ significantly from those who study in private universities, with in order to achieve an experimental camouflage with which to demonstrate if the gamified dance integrated into the professionalization courses allows the development of more suitable profiles for digital and social performance. Everything described can be stipulated in order to overcome the shortcomings that the predisposition of the students in this study could have caused when they knew that they would be exposed to an experimental treatment, which can be overcome in a subsequent study taking these limitations into account.

Data availability statement

The datasets presented in this article are not readily available because no permission to be publicly displayed. Requests to access the datasets should be directed to jhonholguinalvarez@gmail.com.

Ethics statement

The studies involving human participants were reviewed and approved by Comité de ética de una universidad privada de Lima. The patients/participants provided their written informed consent to participate in this study.

Author contributions

JH-A and JC-M contributed to the conception of the design, methods, execution, data collection, as well as to the revision of the manuscript. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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