



# Dance and New Technologies: Different Interdisciplinary Approaches in Teaching and Practice

Isadora Alonso Faustino<sup>(✉)</sup> and Daniela Gatti

Corporal Arts Department, Arts Institute, Unicamp University, Campinas, Brazil  
isadora.alonso.ia@gmail.com, danigatti@unicamp.br

**Abstract.** The present article's goal is to present reflections on the integration of technologies in the field of dance, whether in a context of performance environments or teaching-learning ones. It also shares experiences and insights about interdisciplinary projects that involve dance, music, and new technologies. Therefore, the main goal is to showcase the challenges faced and the benefits of this interdisciplinary approach, as well as the opportunities that arise from the intersection of these different fields. Supported by a brief historical context, the potential of technology's use in relation to dance is explored, both from the perspective of the researching artist and that of the educator. Finally, the article seeks to understand how to expand the accessibility of this interaction between dance, music, and technology in various contexts. The ultimate aim is to bring the research conducted within the university to broader audiences and locations.

**Keywords:** Dance · New Technologies · Interdisciplinarity

## 1 Introduction

The convergence of technology and telecommunications has had a significant impact on the relationship between people. With computers and mobile devices, distances have been shortened, and the dissemination of information has become much faster. Postman (1994) discusses the surrender of culture to technology and elaborates on the effects resulting from the integration of these new technologies:

The users were affected by an unbridled information avalanche that presents in its diagnosis an information disorder unable to meet the needs if its user is not prepared for its production, communication, and use (Postman 1994, p. 204)<sup>1</sup>

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<sup>1</sup> Original text: [...] Os usuários foram afetados por uma avalanche informacional desenfreada que apresenta em seu diagnóstico um distúrbio de informação incapaz de atender às necessidades caso seu usuário não esteja preparado para a sua produção, comunicação e uso. (Postman 1994, p. 204).

Technologies, understood here as devices created to facilitate human life, will have their focus of analysis in this paper concentrated on communication, information, and audiovisual technologies. What we are experiencing today is a new relationship with technologies, with the merging of reality and virtuality, where technological innovations begin to dictate a new societal functioning. Author Alessandra Bittencourt, when discussing the effects of this technological revolution, states that “brought changes and affected interpersonal relationships, as well as the relationship between humans, between humans and machines, between humans, machines, sciences, and arts.” (Bittencourt 2005, p. 3).<sup>2</sup>

Dance, as a significant language and artistic expression of our culture, has also undergone transformations due to its interaction with the electronic era, as our bodies carry new traits and thought structures resulting from the interaction established with this digital and computational age, which greatly impacts dance creation. Merce Cunningham (see footnote 1) revolutionized dance with creations that employed audio, video, and motion capture technologies from the mid-1960s until the 2000s, when he began incorporating computers. Body, space, sound, image, sensors, and devices were utilized in service of dance, in order to create multi-linguistic works that served as a breeding ground for numerous interdisciplinary studies in dance up to the present day. Among them, one of the most prevalent would-be video dances, dance creations made exclusively to be recorded on video and displayed on screens.

Body-related research that engages with technologies is in constant evolution, and due to our current era of heightened interaction between the real and the virtual, new demands emerge to ensure the relevance of this type of work. Therefore, it's important to grasp that these works are always subject to change and, as Cunningham (1994) notes, they are in a process that can often lead to the development of future endeavors.

My work has always been in process. Finishing a dance, I have the idea, often weak at first, for the next one. In this way, I do not conceive each dance as an object, on the contrary, I see it as a small stop on the way (Cunningham 1994, in Vaughan 1997a, p. 276)<sup>3</sup>

The social isolation we experienced in the years 2020 and 2021, due to the pandemic, marked a significant milestone for the production of videodances worldwide. The cell-phone, which was already a prevalent tool in the artists<sup>4</sup> daily lives, became integrated into many compositions and facilitated access to video editing apps, making the creation

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<sup>2</sup> Original text: “Trouxeram mudanças e afetaram as relações interpessoais, assim como a relação do homem com o homem, do homem com a máquina, dos homens e das máquinas com as ciências e as artes.” (Bittencourt 2005, p. 3).

<sup>3</sup> Original text: Meu trabalho sempre esteve em processo. Terminando uma dança, fica-me a ideia, frequentemente fraca no início, para a próxima. Dessa forma não concebo cada dança como um objeto, ao contrário, vejo-a como uma pequena parada no caminho. (Cunningham and Vaughan 1997a, p. 276).

<sup>4</sup> Merce Cunningham (1929–2009) began his professional career at age 20 as a soloist in the Martha Graham Dance Company. Over his long career, Cunningham welcomed new technologies, working with dance on film, computer programmed choreography, and even motion capture technology for the piece *Biped* (music by Gavin Bryars) in 1999.

and study of dance even more accessible. Menicacci (2004) discusses this process of democratization of technology access and highlights its effects on dance.

The democratization of motion capture could open new perspectives for teaching dance. There are many instruments and techniques, and they will multiply rapidly, also becoming more accessible. It is necessary to introduce them in dance education. (Menicacci 2004<sup>5</sup>)<sup>6</sup>

Within this context, my journey as an artist, educator, and dance researcher comes into play. I strive to explore an interdisciplinary connection between dance, music, and new technologies in order to comprehend alternative ways of working with dance, while ensuring it retains its essence rooted in the human body. This essence doesn't rely on any technological apparatus to exist, yet it has been and continues to be influenced by this new way of interacting, understanding, and existing in the contemporary world.

This article aims to demonstrate how technology can be integrated into the teaching and practice of dance, considering its evolution and increased utilization, and contemplating the social implications and new habits that have emerged during and after this period. The theoretical foundation was built through examples of projects designed and experienced throughout the history of dance, engaging primarily with the works of Merce Cunningham and Daniela Gatti. For the analytical aspect of these projects, the dialogue is established with Alessandra Bittencourt, Ivani Santana, and Lucia Santanaella.

To achieve this, it is anticipated that the interdisciplinary relationship between technology and dance practice will demonstrate great potential. Beyond enhancing the artistic experience, it has the potential to serve as inspiration for the new generation, which was born and raised in a digital environment. Furthermore, the aim is to illustrate how this strategy can be employed and adapted to various contexts without overshadowing the physical work and bodily experience intrinsic to dance.

## 2 Interdisciplinary Experiences Between Dance, Music, and New Technologies

To expose the body to a technological environment means to make it sensitive to different stimuli and consequent reactions. When an artist decides to create within this context, they assume that their body won't be the highlight of that work, but instead that the work won't exist without this dialogue. In different and multiple situations, the connection between art and technology becomes the fundamental link for a work to happen.

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<sup>5</sup> Citation referring to the text: "O ensino da dança face à tecnologia digital" by Armando Menicacci in Portuguese by the Consulate of France in Rio de Janeiro, available at <[www.idanca.net](http://www.idanca.net)>.

<sup>6</sup> Original text: A democratização da captura do movimento poderá abrir novas perspectivas para o ensino da dança. Os instrumentos e as técnicas não faltam, e vão multiplicarse rapidamente, tornando-se também mais acessíveis. é necessário introduzi-las no ensino da dança. (Menicacci 2004).

It was from this perspective that the interactive performance of dance and music emerged at the *Jardim das Cartas*<sup>7</sup> exhibition, in 2022 at the Art Gallery of the Unicamp Institute of Arts, in which the authors had the opportunity to have a performative and improvisational experience in mixed reality. This performance was in partnership with the research group *Núcleo de Dança Redes: Processos Criativos em Redes de Saberes*. In this, virtuality and reality were mixed through projections of pre-recorded videos that were influencing the dance movement of the creative interpreters. The movement, in turn, dialogued with the music, created live by the musicians Manuel Falleiros and Alexandre Zamith, the second one also being a teacher<sup>8</sup>, who integrated the work from a distance, just following it via live transmission. The cell phone also composed the work, in the form of an app called *Movie Guitar*<sup>9</sup>, which allowed the performers to create sound overlays with this sound generator, triggered by the movement of the device. Sound, image and movement walked towards a conceptual and constructive identification, in order to create a dissolution of boundaries between visuality and sonority (Figs. 1 and 2).



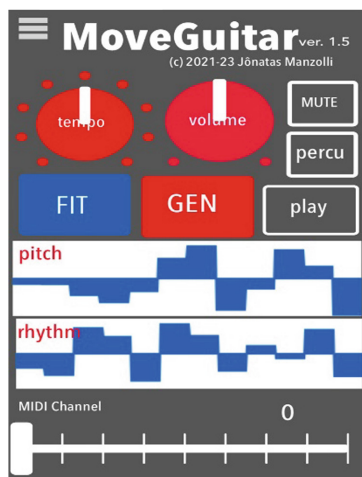
**Fig. 1.** Jardim das Cartas (2022). Source: Personal Archive. Picture: Diogo Angeli

Collaborative works like this work under a different organization, since to exist they depend on the harmony between all these languages that, in the context presented above,

<sup>7</sup> Jardim das Cartas was a poetic proposal conceived by Jônatas Manzolli, a professor in the music department at Unicamp, based on letters and authorial poems. From them, videos were created by the professor of the body arts department at Unicamp, Mariana Baruco, which served as material for the interactive work. This performance was open to a group of students supervised by professor of the body arts department Daniela Gatti, who also is the leader of the research group *Núcleo de Dança Redes*.

<sup>8</sup> Professor in the area of piano and chamber music at the Institute of Arts of the State University of Campinas – UNICAMP.

<sup>9</sup> The Movie Guitar application was created by Professor Jônatas Manzolli. Its operation is activated through the cell phone's gyroscope, so that when it is moved, sounds are emitted. These sounds are simple chords, which can be selected manually, in the way that best pleases the user. Therefore, when the dancer activates the application and holds the cell phone while dancing, it will emit sounds as it moves.



**Fig. 2.** App MoveGuitar. Source: Personal Archive.

do not exist individually. The dialogue between dance and technology is very significant for the work and it needs to be flexible to adaptations, since it will undergo modifications according to the type of structure of the space it will occupy. The spaces, in turn, even if they are more conventional, as is the case with Italian stages, have different physical structures according to each place, which directly impacts the development of the work. Factors such as internet connectivity, availability of power outlets or structures to support certain equipment, have a great influence on the works.

It is observed, in dances present in works such as the one mentioned above, that the relationship between the movements and the space suggests a different type of thinking, since what will dictate how the dance will succeed is precisely the disposition of the materials and tools technologies across space. The choice of movements, which in turn dialogue with the stimuli offered by technologies, will also vary according to the infrastructure. The placement of the performers in the space is often done in order to allow a more adequate dialogue with the technologies and, therefore, the choice of choreographic composition must be made in order to allow a greater capacity for adaptation from one performance to another.

In addition, all layers of technology used instigated a new perception, which influenced the way dance was perceived and performed. The movement should be emphatic in order to be able to generate sounds through the application and the positioning of the interpreters in the space should be thought out in such a way as to allow the association between movement and image. Dance was not the focus of creation, much less music or media, but the relationship between languages. This would be an interdisciplinary approach that, as elaborated by Gatti (2018), “provides a conceptual framework for

working the visual, sound, bodily and spatial aspects of interaction and technological environments, and their relationships” (Gatti 2018, p. 02).<sup>10</sup>

Body research for hybrid performances - performances that mix dance and technology and use this tool to build new forms of movement - can be designed so that there is a dialogue between the body and digital technological devices. Author Ivani Santana, when discussing about this dialogue, which is established when working with dance with digital technological devices, says that “the computer, even when used as a tool by choreographic creation software, begins to operate in a system of permanent dialogue with the creator and with the dancers’ bodies”. (Santana 2003, p. 7)<sup>11</sup>. Understanding the computer as a component and creation tool, one can cite its use to allow video transmission, which can be performed both with live recordings and with pre-recorded scenes, as well as a way of dialoguing with dance done in person.

Working with dance in relation to video or audiovisual, provides the opportunity to rethink the construction of movement, either by capturing a figure from an angle that our gaze has never seen or by affecting time, that is, the dancer’s rhythm. With this possibility, the viewer can be provoked to question what is actually happening in the real moment, because the live dance can dialogue with the videos, which can give the impression that they are being transmitted live, when in reality they are prerecorded recordings and vice versa.

The *Interferências*<sup>12</sup> concert relies on a lot of improvisation work, which is influenced by visual, digital and sound elements that are presented during the show, such as videos and live broadcasts. The use of the camera during the presentation, for example, is related to dance to form movements and experiences that would not exist, completely, without the presence of these technological devices. At one point in the performance, the dance is performed in spaces outside the theater and the movements are captured live by a video that is projected in real time to the audience. This action enables the overlapping of spaces, movements and presentation dynamics, generating an interaction between the internal and external spaces, which are the theater and the exterior, respectively, in addition to providing the public with an expansion of the perception of the performance, which is not limited to, to the spatial limits imposed by the stage.

In addition, even when it is possible to see the dance being performed in person, the video resource is used so that new details and other angles are presented to the viewer, through the mixture of real images and virtual images, which are presented in the form

<sup>10</sup> Original text: “fornece um arcabouço conceitual para trabalhar os aspectos visuais, sonoros, corporais e espaciais de interação e ambientes tecnológicos, e suas relações.” (Gatti 2018, p. 02).

<sup>11</sup> Original text: “o computador mesmo quando empregado como ferramenta pelos software de criação coreográfica, passam a vigorar em um sistema de diálogo permanente com o criador e com os corpos dos bailarinos.” (Santana 2003, p. 7).

<sup>12</sup> *Interferências* was a final paper of the bachelor’s degree in Dance at Unicamp, supervised by Professor Daniela Gatti. It had partnerships with audiovisual researcher Guilherme Zanchetta and musician Eduardo Koji, in a collaborative construction between languages. This dance show was approved in the 12<sup>o</sup> Edital do Programa Aluno Artista [12th Notice of the *Aluno Artista* program], which is part of student support policies in the area of the arts. The dancers and creators of this work are Ana Luiza Gomes, Isadora Alonso Faustino, Maria Isabel Torres, Nicolly Lapa and Rafaella Costa.

of live broadcasts and recordings. All these elements dialogued with the movement, in order to modify it as the camera emphasizes highlights points on the body of the performers, which started to become multidimensional and polysemic at the moment when the image of the virtual body was constructed from the materiality of the real and physical body. That is, from the exposure of the real body and material to digital technologies for capturing and recognizing movement, virtual images of these bodies were created, images that, in turn, were inserted and interpreted within the performance, directly influencing the dance work and improvisation of the performers (Fig. 3).



**Fig. 3.** *Interferências*. Source: Personal Archive. Photograph: Letícia Campos.

One of the ways of creating this virtual body was through the use of a sensor, called *Kinect*<sup>13</sup>, which has a built in camera that was activated by the computer and was capable of mapping and recognizing the body of the four interpreters. With it, shapes were projected that responded to the movements, which in turn were also affected by this relationship, since to be captured they had to be within the visual field of the device's camera. Virtual volumes and textures are affected by the dancing body, which in this performance is used as a transmission vehicle (Gatti 2023).

Besides, the public was also invited to be part of the show, with its presence being contemplated in the moments of live filming. This invitation to participate was designed with the aim of establishing a communication that was not unidirectional, in which artists and observers could compose a relationship of exchange and complementarity that would result in different interpretations and reactions to the show, a dynamic contemplated by Gasparini and Katz (2014, p. 55) when they state that: "With regard to communication

<sup>13</sup> The Kinect sensor is a legacy product originally released for the Xbox 360 and then the Xbox One series with the Kinect Adapter. Information available at: < <https://support.xbox.com/en-US>>.

between work and public, it is alive, and continues to develop after a first contact because the flow of information exchange between body and environment is unstoppable”.<sup>14</sup>

Public participation took place in moments of overcoming the boundary between stage and audience, in which the exchange between these two spheres took place in passive and active ways, with more or less participation with the spectators. Through danced interactions on the outside of the theater, there were encounters between the dancers and people who were not necessarily participating in the show, which generated a direct and relational contact, in which all reactions became stimuli for the improvisation of movements, checking, then, an unprecedented character to the work, which is transformed according to each established contact.

The cell phone was also incorporated as a scenic element and was used as a materialization of technology within the show, being a necessary tool for the live streamings and recordings to happen. While the scene was taking place on stage and the live filming was being done, the cell phone would turn to the audience, showing the faces of the viewers, which was an indirect interaction between spectator and artist.

Furthermore, phone calls and messages were also sent to people in the audience who had provided their phone numbers when they bought their tickets for the performance. Thus, in another moment, the real and present forms of the body merged with the virtuality, so that both bodies shared space on stage. Santana (2003) dialogues with the idea of an audience with active participation, and argues that:

In contemporary arts, the plane bends back inwards – and carrying its exterior inwards. Its dimension is three dimensionalized. [...] As a public one is not contemplated, it is observed recognizing itself as an impicator in this observation. (Santana 2003, p. 7)<sup>15</sup>

In addition to being affected by the filming and live broadcasts, the body affected and was affected by the layers of sound. The Movie Guitar application (se já usou antes, trocar por app) was used, as well as other sensors and sound and movement capture softwares, responsible for generating interactive projections with visual effects that responded to movements and music. Access to these elements was present throughout the creation process, which directly interfered in the choreographic dynamics, since it enhanced the dialog between reality and the show’s virtual imagery. In this way, dance and music are allowed to be permeated by real events, shaped by the relationship with the technological elements used, such as the video resource, for example, which enables new dynamics to the show, seeing as it allows the time of the scenes to be manipulated in a way that would not be possible in a live presentation. The images used, therefore, could be modified thanks to the resources available, a fact discussed by Santanella (2020), in which the author states:

<sup>14</sup> Original text: “No que tange a comunicação entre obra e público, ela é viva, e segue se desenvolvendo depois de um primeiro contato porque o fluxo de trocas de informação entre corpo e ambiente é inestancável.” (Gasparini e Katz 2014, p. 55).

<sup>15</sup> Original text: Nas artes contemporâneas, o plano dobra-se voltando para dentro – e carregando o seu exterior para o lado interno. Sua dimensão é tridimensionalizada. [...] Como público não se contempla, se observa reconhecendo-se como impicador nesta observação. (Santana 2003, p. 7).

Formal and formalizable image, but permanently modifiable thanks to the instrument's ability to rapidly encode the representation elements through the successive transformation of parameters. In this multiplicity of possibilities, always reversible, the virtual subverts the register of traditional time, as time that runs and perpetually restarts is constituted by this image. (Santanaella 2020, p. 80)<sup>16</sup>

Creating a dance show that dialogues with technology, both in its conception and in its thematic inspiration, requires a creative search that needs to be shared by the whole team so it can include all the areas. In addition, the dynamic between the different spheres of activity was based in the relationship with the performative environment that shapes how the contact, direct or not, with technology will be established and with that would be possible to understand how these situations affect and perpass the body. In this way, the body would become action, rather than a performance, because all of these technological stimuli, or not, that interacted with the performers during the show affected and influenced its creation. This work is known as Embodiments and, as explained by Santana (2003), it means that each new experience between the individual and the environment will create new bodies, thanks to that contact with different contaminations.

As a result of the construction of this work emerged a dramaturgy that sought to provoke in the audience a sense of unease linked to questions about today's lifestyle, which revolves a lot around contact with technology.

*Interferências* provokes a sense of restlessness by representing this feeling through the dance of the performers and the use of sound, digital and visual elements during the performance. By combining music, dance and technology and exploring the possibilities of creation that derive from this combination, the show performs a multi- and interdisciplinary work, which allows the audience to be exposed to a variety of meanings, including the daily restlessness of a reality highly influenced by technology.

The creative work involved personal - and at the same time collective - exercises to interpret the meanings that each of the performers attributed to their relationship with technology. The search for experiences that would inspire productions for the show resulted in various ways of embodying the positive and negative sensations related to technology, such as anxiety, agitation, comfort, boredom, immediacy and the restructuring of relationships.

Added to this, musical, visual and digital interpretations of these sensations are also explored. As previously mentioned, from the use of apps and software for recognition and replication of movement and music production, in addition to live music, a process of "translation" of sensations to musical rhythms and projections of images, videos, textures and colors is carried out.

In a summarized manner, and assuming that immersion in the digital reality is a process shared by many people, it was possible, through the development of all the processes stated above, to provoke a feeling of recognition by the public of the elements

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<sup>16</sup> Original text: Imagem formal e formalizável, mas permanentemente modificável graças à capacidade do instrumento de codificar rapidamente os elementos de representação através da transformação sucessiva de parâmetros. Nessa multiplicidade de possíveis, sempre reversível, o virtual subverte o registro do tempo tradicional, pois o tempo que corre e perpetuamente recomeça é constituído dessa imagem. (Santanaella 2020, p. 80).

and sensations present in the daily life of modern lifestyle. This lifestyle generates consequences that are felt in our bodies, which face a relationship of mutual modification with the environment (Santana 2003).

It can therefore be said that technology is experienced and felt by our bodies everyday and, just as it has an impact on artistic creation, it also has an impact on other aspects of daily life. Therefore, as dance artists and teachers, after going through the creative process of the show, we were instigated to question more about the impacts of technology in an educational context and ways of applying these new possibilities for dance research in teaching spaces beyond the university, in order to reach an audience that doesn't necessarily study dance and understanding that technology in the classroom restructures the traditional teaching habits and generate both positive and negative changes.

### 3 Dance and New Technologies Beyond the University: Teaching Techniques in Different Spaces

The integration of technological resources in dance has proven to be a great strategy for expanding creative possibilities and pushing the limits of teaching and learning. When applied in a teaching context, in schools and classrooms, technology also acts as a great ally to facilitate students' connection and understanding of dance, especially when it comes to the context of basic education schools, where the youngest generations of students have grown up in a digital environment and are already familiar with technological interactions. It can't be ignored, however, the penetration of the internet in today's life and, by analyzing this insertion only through the lens of dance, it's possible to say that this influence brings to people a new access to dance and networked experiments (Bittencourt 2021). Therefore, using technology in teaching means incorporating a language familiar to students and making the learning process more accessible and engaging. This issue has already been highlighted by Bittencourt (2005), when she talks about the importance of studying dance from this new perspective:

The issue of dance education through new media should also be considered in Brazil so that future professionals are not afraid of real, or virtual, organic or silicon bodies, but that they can study dance from another perspective. It is seen that the readaptation of man with technology and art is necessary, including in education, since time and space via the virtual network are different from the time and space of body movement, which we call real. (Bittencourt 2005, p. 11)<sup>17</sup>

Analyzing the technological equipment available today, it was questioned possible ways to transmit and expand the understanding of technology for students and what resources could be taken to a school. From this, some challenges were perceived. Among

<sup>17</sup> Original text: A questão da educação da dança através das novas mídias deve ser pensada também no Brasil para que os futuros profissionais não tenham medo dos corpos reais, ou virtuais, orgânicos ou de silício, mas que possam com isso, estudar a dança sob outra perspectiva. Vê-se que a readaptação do homem com a tecnologia e a arte é necessária, inclusive na educação, já que o tempo e o espaço via rede virtual são diferentes do tempo e do espaço do movimento corporal e que chamamos real. (Bittencourt 2005, p. 11).

them, technical limitations and technological failures, such as the lack of equipment availability and internet connection, in addition to the difficulties in fluidly integrating technology into dance and music work, so that it becomes an addition to the teaching and not a distraction.

This research was carried out with students from two basic education schools<sup>18</sup>, one private and the other public, and from a dance school<sup>19</sup>, all in the city of Campinas-SP, with beginner dance students. All the strategies used in the classroom emerged from the previously mentioned performance experiences: the performance at the Art Gallery and the *Interferências* spectacle. The objective was precisely to investigate whether the same technological devices used in a performative environment could be worked on in a dance teaching context.

The age of the students from the private school was between 6 to 13 years, the students from the public school had between 10 to 11 years and the students from the dance school had 7 to 12 years. During this experience, that took around 4 classes<sup>20</sup> in each school, 60 children participated, and the work was conducted in such a way as to provide greater autonomy to the students, so that they could explore their limits, interests and imprint their identity in the movements in a way they could identify with their dance. We've noticed that these classes could be applied to a very large range of ages, but some adaptations were necessary. One example of a very important adaptation is how the explanation of the exercises were transmitted to the students. Younger kids needed more ludic instructions, for example, instead of saying "feel the difference between heavy and lighter movements", the language used was "move your body like it's made of stones" and then, "move your body like it's made of air". And, in addition to create those instructions, the technology was applied. The students could be instigated to change their movements and to create sounds as their body moved, and later they could be instigated to recreate a movement from some sound they liked the most.

This "formula" of combining traditional elements of dance (like, weight, speed, use of space), with the use of technological resources, was applied to all ages. This was made, in order to improve the learning experience of students, who despite having contact with technology, had not used it creatively in dance classes. As a result, an increase in students' interest in the class was observed, but certain eventualities and limitations arose that required a contingency plan in place. Not all activities could be applied in all schools, we had some infrastructure issues that limited our options.

All schools had sound boxes available and, based on this resource, dance teaching with musicalization was carried out through dynamic activities that worked with rhythm and perception. The use of technologies in teaching and learning was guided by the provision of tools by schools that could be used in the classroom. It is important to emphasize the need to think about the musical work during dance classes:

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<sup>18</sup> The schools were: "Raul Pilla" and "14 Bis".

<sup>19</sup> "Instituto Arnea" is the name of this dance school. It is a specialization school with no fees to students, therefore all the students can study dance without paying any fee.

<sup>20</sup> It was a month of work especially focused on the development of dance in conjunction with technology. It is important to highlight that dance work in all these classes had already started since the beginning of 2023, however with other study focuses.

One cannot talk about dance without thinking about the relationship between space and time, which are inherent elements of this language. In this sense, we noticed that the musical work in dance classes allows the student to develop more temporally, acquiring gains in relation to the rhythmic sense. (Faustino 2022, p. 10)<sup>21</sup>

Mixed reality was one of the proposals worked on. In it, the students jointly developed a choreographic cell (a composition of sequenced dance movements) and remodeled it with rhythmic variations and different spatial placements. The class was divided into two groups that had to dialogue with each other bodily. One of the groups was being filmed and was outside the room, so the only access to communication would be through a live video transmission, which was being projected to the group inside the classroom. Through this creative and playful exercise, students were able to work on a new spatial and social perception. This dynamic however was interfered by the internet connection, which caused delays in the images and impacted the dialogue. Despite this, it was possible to unite the group and use these “failures” in favor of the dynamic.

Nevertheless, only in one of the places it was possible to use the live transmission application, *DroidCam*, since it requires a place to transmit the image for use, such as a projector or a computer, and only in one of the schools these materials were available. In the other two schools, the cell phone was the device that centralized the classes. It was the most accessible technology to work with, in addition to being very present in the students’ lives. With this, it was possible to reframe their functions, which are usually linked to everyday needs. For example, it was proposed the use of the camera in dynamics for creating video dances, which were later used to publicize schools or as interdisciplinary material that would be worked with teachers of other subjects.

Furthermore, students were introduced to Move Guitar and, with an almost innate drive, quickly learned to use the app. One of the main obstacles to the task is the fact that, as it’s still under development, this is not an application available for all devices, which limited its use to only one that was provided to them. Added to this, because the cell phone was held by the hands, the students initially restricted its movement to the arms, without investigating ways to produce the sound through more complex movements. At the same time, as a result of the individualization caused by cell phones, students were focused on their own research, with little affective and social development.

Therefore, it was necessary to bring proposals that integrated all the children, as is the case of cooperative exercises and work with eyes closed, in which the guidance was mostly through sounds, verbal cues and mental images. In other words, they depended on short verbal information that directed the focus of attention to important aspects of the movement or on imagery representations (real or metaphorical) that helped in understanding the activities. These conductions were sometimes made by the students themselves, in order to stimulate sociability and autonomy in dance.

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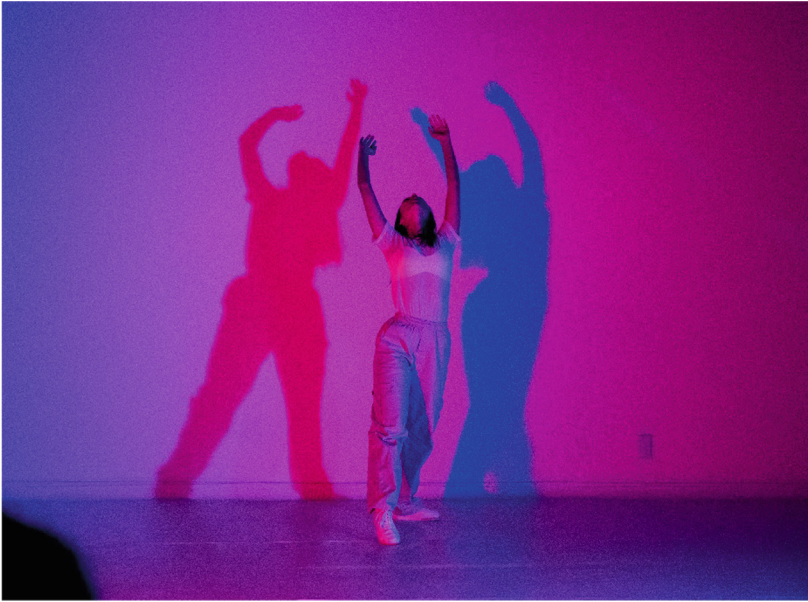
<sup>21</sup> Original text: Não se pode falar em dança sem pensar na relação espaço e tempo, que são elementos inerentes a esta linguagem. Neste sentido, percebemos que o trabalho musical nas aulas de dança possibilita que o aluno se desenvolva mais temporalmente, adquirindo ganhos em relação ao senso rítmico. (Faustino 2022, p. 10).

In the last week of research, it was also possible to carry out another proposal with technology in the private basic education school. The school was interested in the proposed interdisciplinary creation between dance, sound and technology and accepted to provide another space for one of the classes, which had a white wall, ideal for working with shadows created by scenic lights (see Fig. 4). On this last day of activities, the students had already created a choreographic score based on the sounds and were able to delve deeper into this investigation using the lighting. This activity later developed into a very similar exercise that was applied in the work “Interferences” (see Fig. 5), which consisted of using two reflectors so that the shadow created was double, which generated a three dimensionality to the image. This exercise aroused a lot of interest in the students, who constantly wanted to test new ways of moving and creating shadows, creating postures in pairs and groups, which were later explored in another month of activities.



**Fig. 4.** Students working with shadows and dance. Source: Personal archive.

A difference observed during the application of the proposal was the work with technology in basic schools and in dance specialization school, since the target audience of students varies between these two scenarios and, therefore, deals with classes in different ways. It is important to find a balance between technology and body movements that creates a coherent and engaging narrative with the context in which it is situated. In basic education, for example, students will not necessarily be interested in dance, since their curriculum will be broader. Therefore, the activities must be very dynamic and must stimulate different areas of movement, in order to lead the student to try new movements, thus stimulating creativity and motor coordination without insisting too long on the same proposals. In specific dance training schools, activities can be more in depth and precise to provide greater technical evolution. In both cases, teaching strategies combined with technology are excellent allies to expand students' creative possibilities and help them develop their artistic expression in innovative ways.



**Fig. 5.** Shadows in *Interferências*. Source: Personal Archive. Photograph: Leticia Campos.

## 4 Conclusions

The collaboration between dance, music and new technologies, which was analyzed in the previous paragraphs, showed that the interdisciplinarity between these areas of knowledge makes it possible to expand the boundaries of artistic expression and creates innovative experiences with great creative potential, whether in performative contexts or in teaching and learning contexts. The technological resources and methods applied in the classroom or in shows and performances will vary according to the contexts, but it is important to emphasize that mobile devices, such as cell phones, democratize access to technology and allow for new opportunities for the development of approaches that reformulate dance work.

By analyzing and observing the history of the use of technology in dance, it is clear that the evolution of the presence of digital in everyday life has transformed human behavior. It is essential, therefore, that teachers and artists are willing to work on an inter-communication between technology and dance to discover ways to use them together, and in the best possible way, to achieve the objectives of each project.

Within the two main topics exposed in this article: dance shows and dance teaching in classrooms, in which the representation and use of technology were analyzed, traces of similarity can be observed. Even with totally different proposals, when exposed to the use and practice with technology, these two contexts obtained similar results.

The use of the *Movie Guitar* application, for example, was a technique covered by both topics. The shared use of this technique shows the flexibility and versatility provided by this method which, both in *Interferências* and in the schools, was used as a tool to boost improvisation in dance.

For instance, the dance performed in the show was a language familiar to the performers and, therefore, the sounds created only responded to the movements made from improvisation. In addition, in that context, the sounds and dance dialogued with the projections in a scenic and performative way, which was fundamental for the narrative construction of the show. In schools, as a pedagogical practice, cell phones and apps were also used in dance improvisation contexts. However, since the children did not have a very varied repertoire of movements, they constructed their movements based on the app's sound stimuli, and not the other way around, as happened in *Interferências*.

In addition to the issue of improvisation that was shared in both topics, the high connection between everyday life and technology was evident. This link was explored in the spectacle and the schools through artistic representations of the effects of technology immersion in modern society and by the intimacy presented by students, when exposed to cell phones and applications respectively.

However, with regard to the educational context, even if it is an interesting and useful tool for improving dance teaching, technology should not assume an unique and exclusive role in the teaching process. It's necessary to avoid excessive dependence on it, in order to not replace face-to-face interaction between students and teachers with virtual interaction. Dance is a form of corporal and artistic expression that requires human connection, emotional and physical expression and the excessive use of technology can dilute these elements, which are fundamental and necessary for the development of this language.

Finally, this work and the raised applications act as an active process of thinking and acting in the face of a reality highly influenced by technological advances and their growing presence in the social spheres that permeate and transpose the routine of individuals. In an effort to study, understand and produce from and through this reality, artistic and pedagogical processes enter as tools and responses to deal with a technological world that creates new forms of socialization and relationship, in a continuous and dynamic way, besides to changing the way you deal with everyday life.

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