

EXPLORING THE INTERSECTION OF DANCE EDUCATION AND DIGITAL TECHNOLOGY

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Abstract

Digital technology is reshaping the traditional approach to teaching dance. Choreographers and researchers of pedagogy and composition must adapt to the transformations that have taken place in recent years. From the teacher's point of view, the integration of digital technology, guided by the principles of dance education, offers numerous benefits, even if it cannot replace the physicality and bodily experience of dance training. Recent studies suggest that digitizing choreography could serve as a new pedagogic model. Incorporating digital techniques in dance classes and performances could result in increased fluidity of body movement. Dancers have reimagined body techniques through the use of digital tools, exploring new movement possibilities and conceiving novel choreographies. Video recordings have been used not only for feedback, assessment, and analysis but also for helping dancers refine their technique and gain a deeper understanding of their movement patterns. This article outlines the most important conclusions drawn from direct experience, providing specific examples of how digital technology has been used as a complementary tool to enhance dance teaching methods.

Keywords: digital tools, interactive learning experiences, dance documentation

1. TEACHING DANCE WITH DIGITAL TOOLS

Recent years have seen the introduction of fresh approaches, which have enabled dance to continue to develop as a valuable art form. The relationship established between art and digital technology plays a major role in the present practice of dance. In recent years, research has extensively explored the impact of technology in the field of dance teaching, prompting 'a total rethinking of how teachers have to deliver instructions' (Stanley, 2015). With digital devices, dance teachers can reshape the traditional perspective of teaching art by presenting it in a more attractive manner. Furthermore, interactive media has experienced such a remarkable surge that it now stands as one of the most promising tools for dance education.

During the COVID-19 pandemic lockdown between 2020 and 2021, teachers around the world were faced with the challenge of maintaining their educational programs. While live, online dance classes emerged as the best option, this required significant changes, from lesson plans to classroom management strategies.

2020 saw numerous meetings, conferences, and webinars on distance learning and virtual communication in the vocational education system. Aiming to identify the most efficient “strategies for the integration of technology in the study, technical training, and creative practice of dance as well as the benefits and limitations of online instruction for dance” (Parrish, 2016, p. 168), we reviewed the literature in this area and carried out empirical research on the topic. This led to the recognition of the Internet as an essential link and the principal means of the teaching and learning process during the pandemic period. Platforms such as *WhatsApp*, *Skype*, and *Zoom* proved to be valuable resources for dance teaching, offering both visual and audio resources which provided the opportunity for live and recorded online dance classes, allowing students to learn from the comfortable (albeit not ideally suited) space of their homes.

Digital literacy has become an essential skill for today’s dance teachers. Several studies on the digitalization of dance education, as well as projects aimed at designing and implementing digital technology in dance curricula, have been helpful in developing new dance teaching methodology. Nevertheless, the integration of technology in the dance classroom raises complex issues, such as how to develop choreographies via videoconference, how to hold interactive dance classes, or how to build community through online platforms.

Dance practices have been reshaped through teachers’ and students’ experiences with this novel computer-supported collaborative approach to learning, which are markedly different from the physical environment that they were accustomed to.

1.1 Classroom Technology

The integration of technology into dance education has had a major impact on developing a creative and engaging learning environment. The use of mobile phones, Mini-Netbooks, and other handheld devices in dance classes enabled personalized feedback to students through video analysis tools. By watching recordings of the dance technique or specific dance repertoires that the students learned that day, new skills and information were understood and assimilated more effectively.

Using interactive multimedia devices like CD-ROMs and USB flash drives during dance classes and improvisation sessions contributed to the demonstration and preservation of as well as quick access to some of the notable works of famous choreographers. These approaches not only increased students’ self-motivation but also heightened their perception of dance throughout the learning process, while at the same time building a sense of community.

Video conferencing platforms used during the pandemic period such as *Zoom* as well as specialized dance teaching platforms, have led to the development of a novel approach aimed at providing students with greater flexibility. This new strategy involves the integration of both in-person and online components to create hybrid classes. Integrating new technology in these hybrid dance classes provides interactive learning experiences and enhances student motivation.

Grounded in several case studies from the worldwide dance community found in the *Research in Dance Education Journal* between 2020–2021, the addition of technologically-supported learning in my dance classes improved student

engagement and enhanced the learning process. Furthermore, it opened up opportunities for both student dancers and teachers to connect with a wider audience and receive instant feedback on our activities.

The framework and tools we developed serve as the groundwork for organizing an international dance project, *Move On-Line*, where three dance professors from three prestigious European universities (in Italy, Romania, and Spain) conducted online masterclasses in August of both 2020 and 2021. We discovered together that digital platforms simplify the process of bringing professional choreographers to the students, exposing them to diverse styles and perspectives. As Parrish (2001) notes, “Internet resources originate new strategies for learning while acting to strengthen the global community and informing student’s growing definition of dance education” (p. 20).

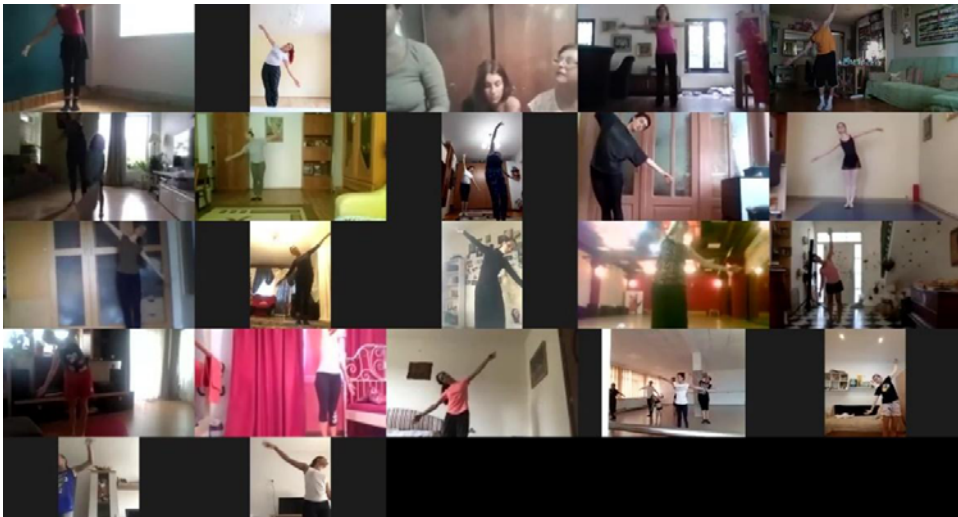


Figure 1. Screenshot from a Cunningham Technique Class conducted by prof. Dino Verga from the National Dance Academy of Rome, Italy

Inspired by this innovative educational context, I have collaborated with colleagues from similar universities in Romania and abroad on shared courses about the history and theory of dance.¹ Using digital platforms and tools, our aim was to design interactive lessons on the history of dance that integrated multimedia elements such as videos, animations, and quizzes, with the goal of making the study of the evolution of dance engaging for the students. In modern dance pedagogy, proficiency in digital literacy (Parrish, 2001) and an open-minded outlook are crucial for developing an effective teaching and learning environment.

¹ Interactive Dance History Classes with lect. Cristina Todi from the Theatre and Performing Arts Faculty of George Enescu University, Iasi, Romania (2020); Dance Theory Classes shared with lect. Horatiu Chereches from the Faculty of Theatre and Performing Arts of the University Ovidius from Constanta, Romania (2020); Interactive Online Dance History and Dance Theory Classes with prof. Rosa Belen Ardid Perez from the Superior Conservatory of Dance from Alicante, Spain (2022 and 2023).



Figure 2. Screenshot of an interactive lesson on the *Screen dance* technique shared with students and prof. Rosa Perez from the Dance Conservatory of Alicante, Spain

By integrating digital tools into dance education, we can transform traditional teaching methods, rendering them more interactive, inclusive, and responsive to the needs of today's tech-savvy students (Alexander, Bohem & Glen, 2023). This approach not only enhances the learning experience but also prepares students for a future in dance, where technology plays an increasingly significant role.

Although there is no doubt that technology offers significant potential within the field of dance, it is unable to replace the physical aspect of dance training. A dance teacher understands that active learning requires body action and movement exploration. In that respect, digital tools could serve to enhance the activities of both teachers and students. Combining traditional dance teaching methods with modern strategies focused on students' educational needs can facilitate accurate, time-efficient, and accessible learning in dance.

2. INTERACTIVE LEARNING EXPERIENCES

The importance of mastering a non-verbal vocabulary is essential for dance students. Interdisciplinary projects, which engage students from the fields of music, dance, and visual arts, have the potential to immerse students in a context where they can cultivate and practice their capacity to attentively take advantage of various approaches for conveying the same concept. Through collaborative art projects, students learn to articulate their artistic vision and explain the meaning behind their work.

Furthermore, digitizing choreography has emerged as a tool that is capable of changing students' preconceptions of the limitations of dance. While utilizing animations and sensors in students' routines presents certain challenges, these technologies stimulate new forms of knowledge and build new mental and physical constructions. Through innovative body experiments, student dancers are able to refine their gestures and body movements, leading to an expressive and meaningful dance form.

Starting in 2017, I began actively involving my student dancers in technology-centered artistic events, collaborating with musicians and visual artists interested in multimedia performances. Digital tools and resources were used to bring authenticity, high quality, discipline, and innovation to choreography, and This digital learning extended across various areas of the dance curriculum. For instance, my Dance Techniques and Improvisation course featured techniques for digitally instrumentalizing body movements. This approach was inspired by William Forsythe's multimedia work *Improvisation Technologies – a Tool for Analytical Dance Eye*. This project introduced a cognitive methodology for computerized dance composition, employing mathematical, geometric perspectives. According to Forsyth's method, digital technology enables choreographers to develop *choreographic* algorithms, objects, and constructions (Forsythe & Kaiser, 2014).

Three aspects of Forsythe's approach are used in my dance-creating and teaching process:

- Ingeniously using spatial transformations to generate new dance movements;
- Dancer interaction with projected images or videos;
- Intertwining the acts of drawing and dancing (Forsythe & Kaiser, 2014).

Adopting Forsythe's theoretical model, multimedia is used in choreography in an attempt to merge digital technique with body technique, presenting exciting and challenging opportunities for all performers, both dancers and visual artists alike. Creating dance constructions based on movement algorithms represents a viable dance composition method for today's pedagogues. By applying this method, students are challenged to study, explore, and analyze the impact of multimedia dance performances. Interactive multimedia dance performances are collaborative projects in which musicians, choreographers, dancers, visual artists, and technicians explore and discover a harmonious flow of sound, projected imagery, and dance, transforming the stage into a specific space for experimenting with new means of expression.

2.1 Multimedia and Dance

Over the past decade, multimedia dance performances have become increasingly common. By integrating dance and visual art techniques, these performances encourage dancers to interpret dance not only in the context of history and society but also in relation to technology and the virtual environment. Digital technology can be integrated into live dance performances through interactive installations; For instance, sensors and motion tracking systems can respond to dancers' movements in real time, triggering visual effects, soundscapes, or interactive projections. Such fusions of dance and technology create immersive and multi-sensory experiences for audiences.

The exploration of multimedia elements in dance performances has been the focus of my dance pedagogy, which aims to transform dance education through interactive learning experiences.

Multimedia dance performances *Diverse Dimensions*, *The Geometry of Echo*, and *Pulse of the City* incorporate dance techniques and multimedia content with the purpose of making complex stage concepts easier to understand and, by appealing to multiple senses, enhancing the engagement and knowledge among the students involved. Such collaborative projects broaden perspectives through diverse interactions, develop critical thinking abilities, and foster a sense of community.

Diverse Dimensions (presented at the digital arts festival *Elektro Arts* in 2017) was a performance built on the idea of capturing the audience's interest. Instead of relying on the decorative features 'or emotional force of dance, it focused on the conceptualization of the human body as a social and anthropologic symbol. Body, space, and motion were both objectified and technologically exploited.

In *The Geometry of Echo* (presented at the digital arts festival *Elektro Arts* in 2018), we combined contemporary dance with interactive audio-visual techniques produced by visual artists coordinated by Diana Drăgan Chirilă and Andrei Budescu. Dancers' movements were amplified by graphics, and conversely, the graphics generated motion – the dancers' bodies becoming the focal point where the real and virtual melded together.

Over the years, the collaboration between visual artists and dancers has fostered the growth of creativity and interdisciplinary communication. *Pulse of the City* (performed in 2022 at the *Dance Days* festival organized by the *Gheorghe Dima* National Music Academy in Cluj-Napoca, Romania) was an interactive multimedia dance performance that encouraged students to explore interdisciplinary connections between dance and other art forms such as music, visual arts, and theatre.



Figure 3. Fragment from the performance *The Geometry of Echo*.
Photo: Diana Drăgan-Chirilă (2018)

The analysis of the above-mentioned performances together with my students revealed a profound level of understanding and execution of dance movements when dancers participate in interactive multimedia performances. These performances challenge them to find personal solutions in adapting their dance technique to specific projections, animations, video mappings, or other visual techniques. This promoted thorough participation in the creative process. In terms of dance education, this kind of practice-as-research approach increases students' motivation, resulting in complex, dynamic, and surprising outcomes.

2.2 Engaging Learning Experience

Each music and dance exercise in a multimedia environment developed a sense of rhythm and musicality, and students learned that the language of music and dance relies on an equation that includes time, rhythm, form, and symmetry and is related to space, dynamics, style, and expressivity. Space was not the only element that was changed in this process: the performers also had to adapt their modes of communication. In dance performances influenced by digital technologies, dance fundamentals – body, space, movement – are redesigned, emphasizing identity, and the transformations of the real world. In this respect, a re-evaluation of the body becomes essential, as it is now governed by digital standards, requiring the delineation of concepts that will resonate with the audience.

In our experiments, every dancer had to discover their individual solution to physical, mental, intellectual, and communication challenges, all of which were integrated into an act of artistic creation shaped by the presence of video projections. Striving for both technical excellence and artistic expression, dancers had to face the limitations imposed by visual scenography, such as abrupt changes in lighting or constrained dance spaces. In response, we embraced this evolving stage environment as a new standard, where technology serves as an additional tool for enhancing dance composition. In this context, choreographing involved a close collaboration with the specific digital visual setting. For the dancer, this entailed the intriguing task of connecting with their imaginary partner depicted through video projections and adapting to the stage concept, a challenge that demanded both constant versatility and mastery.

An interactive multimedia dance performance reshapes the dynamics of direction and interpretation. In such performances, the projected visuals influence dance movements and alter the perspectives of performers, visual artists, and audiences alike, thereby transforming the dance performance into a multisensorial experience. These unique responsibilities necessitate a strong partnership between the choreographer and the visual designer. The process of choreographing and creating visuals for a multimedia dance performance involves an exploration to uncover a shared synergy between the projected imagery and dance. This synergy aims to transform the stage into a unique space where new forms of expression are experimented with. By exploring the intersection between dance and digital visual arts, we aimed to achieve the following educational goals: learning through interactivity, fostering teamwork, and conducting practical stage-based research.

Through taking into account technological progress and digital exploration, we sought to go further and exploit new ways of expression as well as new staging possibilities. Starting with online improvisational music and dance meetings between choreographer Nicoleta Demian and the musicians of the *TonArt Ensemble Hamburg* in 2020, we proposed an online music and dance performance based on digital technologies and the features available on the platform *Zoom*. In the following year, we decided to further develop these online music and dance improvisation sessions by involving student dancers from the National Academy of Music Gheorghe Dima in Cluj-Napoca. The resulting *Disdance* performances, created remotely and collaboratively, were presented exclusively online,² which allowed students to showcase their skills and receive recognition beyond their local community. Dancers from Romania and musicians from Germany came together virtually to create unique music and dance pieces, breaking down geographical barriers. With these projects, we proposed our own key elements for managing a virtual music and dance performance that culminated in a new learning experiment and promoted a genuine artistic experience.

As noted by Krista Glazewski (2019), the need for computer-based teaching and learning processes and curricular innovations suddenly emerged at the beginning of 2020 due to the pandemic lockdown. Dance teachers worldwide found themselves compelled to explore and implement digital technology in their classrooms, whether they were prepared for it or not. Since then, digital technology has proven to be a valuable support tool, with educators possessing a better understanding of how and under what conditions to adopt and adapt to new practices. Teaching dance with digital tools has proved to be a powerful way to enhance the learning experience, reach a wider audience, and make dance education more engaging and accessible.

3. DANCE DOCUMENTATION AND PRESERVATION: CREATING A DANCE COMMUNITY

In contemporary culture, the art of dance occupies a prominent role due to its aesthetic, social, and psychological impact. In the past, dance and choreography were primarily archived through photographs capturing dancers in various poses during their performances, as well as through various dance notation systems.

Media technology is inextricably linked to performance arts in the 21st century. Nowadays, innovative practices create a convergence of performance and new media technologies. Consequently, documenting a dance performance now requires collaboration with information science and with computational data management. Documenting and preserving dance using digital tools (Lösel, 2021) is essential for ensuring that this form of artistic expression is passed down to future generations and can be studied and appreciated by a wider audience.

William Forsythe (American choreographer, b. 1949) elaborates his perspective on the *digital dance school*, an interactive computer installation released as a CD-

² *Disdance. Online - improvisation: Dance & Music from Nicoleta Demian (Cluj, Romania) and TonArt Ensemble (Hamburg). Rehearsed during the Corona lockdown. Ein Projekt des Online Musicking Call Mai / Juni 2020 des Verbands für aktuelle Musik Hamburg, gefördert von der Behörde für Kultur und Medien Hamburg. <https://youtu.be/f3UNAIL6Hyc>*

ROM featuring 60 video chapters in which he demonstrates and comments on the essential principles of his movement language (*Improvisation Technologies*, 1994–1999). Alongside this innovative educational project, he initiated a ‘library of movements’ – *The Motion Bank*, a four-year data collection project (2010–2013) that captured dancers’ movements with video cameras and *Microsoft Kinect* sensors. The data was then analyzed and visualized through animation, with dances documented as data point sets and transmuted into a computational language.

Forsythe’s experiments and Motion Bank projects have laid the groundwork for further experiments in dance education, performance analysis, choreographic coding labs, and annotation as a research practice in dance. Through his projects, he demonstrated that the vast potential of this field and the creativity that can be achieved in the teaching and learning process through the integration of digital tools.³

In the last two decades, practitioners, researchers, and scholars from all over the world have contributed to the definition of this form of new media art through performance analysis and critical exchanges (Dixon, 2007). The *International Journal of Performance Arts and Digital Media*⁴ offers studies and research-based experiments investigating this new cultural code of digital performance.

Furthermore, numerous universities and theatres have created digital archives or repositories for the storage of recorded videos, audio, photographs, and other relevant documents of their performances. Currently, alongside social media and streaming platforms for reaching a wider audience, more and more websites and platforms are dedicated to dance preservation and education. The use of high-definition cameras to record dance performances and capture the dance from various angles offers a comprehensive view of the performance and ensures its preservation.

Developing interactive applications or websites will allow users to explore dance history, watch performances, and learn about choreography and dance techniques. In 2022, I collaborated with a team consisting of choreographers, dancers, a musical director, and visual artists to develop a digital platform aimed at stimulating collaboration among students, choreographers, visual artists, and musicians. The *adDance Platform* features a website, as well as profiles on Facebook and Instagram. The platform was created in recognition of its importance for contemporary art practices and to motivate dancers to engage in collaborative projects that involve various art forms, thus fostering creativity and teamwork.

Through collaboration and crowdsourcing, we aimed to encourage dancers, scholars, and enthusiasts to contribute to our preservation efforts by sharing their own recordings, insights, and stories. Furthermore, digital tools allow users to tag, comment, and contribute additional information to the archive. The digital archive and online platform www.addance.ro are used for educational purposes, such as analyzing choreography and dance techniques, reviewing students’ dance videos, and highlighting areas for improvement. Together with my team, we continuously update the archive with new dance performances and research to ensure that it remains relevant and up-to-date.

³ *Motion Bank*. First phase documentation and scores (2010–2014) <http://motionbank.org/>. Current developments: <https://medium.com/motion-bank>. (accessed 12 Jan. 2024).

⁴ *International Journal of Performance Arts and Digital Media*. <https://www.tandfonline.com/toc/rpdm20/current>

By combining these digital tools and methods, we aimed to create a comprehensive and accessible record of dance that preserves its cultural significance and artistic value for future generations. In addition, we sought to create a dance community and a welcoming environment for everyone, thereby promoting a wider perspective on dance.

4. CONCLUSIONS AND OUTLOOK

Convinced of the potential of digitizing choreography as a new pedagogic model, I have incorporated digital techniques in my dance classes and performances, during which the postmodern fluidity of body movement fuses with digital technologies. A variety of digital visual instruments (e.g., video projection, 2D/3D animation, and video mapping) have been used in order to adapt, and create a merger between visual images and dance-specific elements.

In many of our recent performances, dancers immersed themselves in virtual environments that responded to their movements. This physical presence initiated a dialogue with the interactive system, forging a partnership where dancers' movements were captured and transmuted into virtual reality through video techniques. The camera seamlessly extends the dancer's body, producing a kinetic space where artistic expression creates a fluid connection between the physical and digital worlds, allowing for narrative and artistic expression. The collaborative work of the choreographer and digital artists led to the development of stage concepts that react to the dancers' motions, resulting in an uninterrupted stream of music-driven visuals that enhance the graceful flow of the dance. Using motion capture technology and Kinect sensors, dancers precisely captured the nuances of their fluid movements. The physical bodies of the dancers were smoothly integrated into a visual framework that engaged the audience in multifaceted communication encompassing visual, acoustic, chromatic, and emotional elements. This immersive experience enabled spectators to encounter what Reason and Reynolds (2010) describe as "kinaesthetic empathy".

In essence, contemporary choreography can merge harmoniously with digital technologies to push the boundaries of artistic expression, allowing dancers to explore new dimensions and engage with their audience in innovative ways.

Digital platforms such as social media enable dancers and choreographers to reach a wider audience by live-streaming their performances, workshops, or rehearsals. Using digital platforms also allows for global interaction and collaboration. In addition, showcasing student performances and choreography can help them to gain exposure and build their dance careers. The social media platform www.addance.ro was created to build and sustain an online community where dance students can share their progress, ask questions, and connect with other dancers.



Figure 4. AdDance website cover. Photo: Diana Drăgan-Chirilă (2022)

We could conclude that the COVID-19 pandemic crisis has resulted in an accelerated adoption of digital tools in performing arts teaching and practice. In recent years, digital tools have demonstrated their utility in the field of dance education. They provide instant feedback on dance performances, helping dancers refine their movements and explore new choreographies with immediate insights and suggestions.

Through digital communication, my students and I were able to delve deeper into dance education, exploring movement potential, visualizing choreographic ideas, and employing video recordings for purposes such as feedback, evaluation, and analysis. This has enabled dancers to refine their technique and attain a more profound comprehension of their movement patterns. As such, technology has functioned as a valuable enhancement, elevating and enriching my teaching methods. By reshaping the traditional approach to teaching dance and embracing digital tools, those in the field can ensure that this art form remains vibrant, accessible, and relevant in today's diverse and evolving world.

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