Proposal for Integration of Dance Technology into Fusion Dance Academy Curriculum

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Technology is constantly advancing and changing society. Each day we see new technologies advertised, such as the fastest phone and the newest 3D television. Acting on the innate need to complete each of our daily tasks in the simplest way possible, we openly incorporate these technologies into most aspects of our lives (Boykins). Despite society's growing dependence on technology, we hesitate to introduce it to preserved art forms such as dance. Dance changes with society (Midgelow); however, choreographers historically created and presented dances with their hard work, rather than with technological assistance. In the recent technological revolution choreographers introduced technology and dance for they realized the benefits technology brought to dance education. Frame-by-frame captures on video devices allow choreographers to maximize the technical potential of their dancers. Motion modeling technology allows choreographers to explore the capabilities of their dancers and highlight their strengths in performance (Nahrstedt, et al.). Communication between dancers across the globe and the interactions between dancers and non-dancers catalyzes the increased diversity of dance, and communal investment in the creative process (Popat). Fusion Dance Academy is a professional dance company which travels across the country to perform. Dancers from this academy often dance in college, and attend preforming arts schools. Yet instructors there rarely use technology beyond CD players during class, despite these proven technological modes of improving choreography. Teachers at Fusion Dance Academy must begin to incorporate technology into the studio to improve their student's technique, prevent injury, diversify choreography, and connect their dancers to resources across the globe.

In the past twenty years, a technological revolution occurred in America ("History of Computers"). The creation of transistors catalyzed this technological revolution. Transistors act as the building blocks of technology by controlling the currents which mediate a technological device's function. Moore's Law states that the number of transistors that can fit in a certain amount of space doubles every two years. Since 1971 this law has held true with little variation. After many years of intense materials testing, engineers started to use silicon to create circuits on a low budget (Xu). The use of inexpensive materials allows increased availability of advanced technologies to the public. The availability of technology mediates its integration into society, assuming society's readiness to change. According to Shiue, Pan and Yousoff, self-efficiency results in positive attitudes towards the use of information technology (Boykins). The increase in self-efficiency and accessibility during the technological revolution encouraged those who typically would not use technology in their everyday lives to explore the possibilities it creates. The acceptance of technology into daily life by a large population encouraged further materials research in the effort to make technology more accessible to the public. This cyclical relationship between acceptance of technology into the home and research and development of transistors caused the recent technological revolution.

Increased public accessibility to technology encouraged prestigious dance studious to integrate it into their education curriculum. Historically, choreographers took pride in producing dances with only their creativity and a piece of music. Recently, highly regarded professional ballet companies such as the Joffrey School of Ballet began incorporating technology into their program. In 2012, the Joffrey hired Wayne McGregor who the New York Times describes as, "Contemporary-dance creator and new-technology obsessive. (Sulcas)" To keep up with these changing standards of enhancing dance with technology and to maintain good regard in the

dance community, other professional dance schools must incorporate technology into their curriculums.

Fusion Dance Academy is a professional Dance Studio in Dover New Hampshire. Teachers at Fusion Dance Academy teach traditionally without incorporating technology into the dance education curriculum. Studios include three walls of ballet barres, one wall of mirrors, a stereo, and various weights and therapeutic bands. Dancers only receive input to develop technique and style from the single teacher guiding each class. Often, dancers are injured at dance from being pushed too far physically, or by repeatedly doing a step incorrectly. These problems must be remedied for the health of the dancers and the success of Fusion Dance Academy.

If Fusion Dance Academy incorporated qualitative and quantitative analysis of movement into their curriculum with technology, students would perform with fewer technical mistakes. In settings where students regard their dance instructor as the only source of technical knowledge, movement reflection becomes one-sided. As stated in the article 'Streaming video to enhance students' reflection in dance education,' "[Self] Reflection stimulates students' awareness of their body and movement experiences which are necessary for developing high-quality dance skills. (Leijen, et al.)" The Feldenkrais Method of teaching dance encourages students to learn increased awareness of their bodies to reduce pain and increase function ("The Feldenkrais Method"). Without the technology available today, dance teachers historically incorporated reflection into their curriculum by teaching anatomy. Difficulty arose in showing a two dimensional model of the muscular system for not all of the muscles could be viewed, and the simplistic representation did not adequately show the complex motion of a body dancing. Improved technology in the 21st serves as a solution to this problem. Apps such as Visiblebody

allow dancers to interact with the muscular system, viewing each muscle at multiple angles for individualized use. The App Kinesiocapture allows dance teachers to analyze the angles their dancers create with their arms and legs frame-by frame. This simple frame-by-frame analysis allows precise movement unprecedented in the dance world. When a group of dancers do not dance in sync and do not execute steps technically, the story that they are trying to tell through their movement becomes less obvious. For example, if a choreographer creates a pas de deux where the steps for both dancers are exactly the same to show agreement, and those two dancers do not execute the steps technically or rhythmically the same, the audience may not understand their agreement. For a dance to be effective, dancers must be technically precise and in sync. Technology such as Kinesiocapture and VisibleBody increase the precision and technicality required in performance, and must be introduced to dance education for that reason.

Motion modeling technology allows dance educators to maximize the potential of their dancers beyond precision and technique. With the increasing capabilities of computers, choreographers can model movement online with written code. Continuing research on modeling movement computationally allows choreographers to input limits specific to their dancers to compute choreography. This technology uses differential equations to create optimal control-base models which together derive the most efficient way of completing a specific task (Frederico, et al.). With this model of limitation and quantitative analysis of specific dancers, choreographers can model many aspects of a dance. For example, this programming can determine when a dancer will be too physically or psychologically exhausted to continue dancing. Choreographers can calculate the most efficient way for one dancer to lift another, and the most aerodynamic way to complete a leap (Nahrstedt, et al.). Knowing what their dancers are capable of, choreographers may shorten or elongate dances, or give more breaks throughout a

performance so that their dancers maintain the stamina to perform technically and artistically. Without these technologies dancers get hurt because they are pushed beyond their physical limits. At the same time, professional dancers fear medical and psychological treatment in fear of it ending their careers (Dunning). Because dancers passively approach treatment for various health and emotional risks, common problems for dancers such as arthritis, torn muscles and anorexia must be dealt with proactively. To keep dancers healthy and ready to perform, motion modeling technology must be integrated into dance education curriculums.

Dance education must not only consist of individual technical training, but also enriching experiences to diversify a student's background and increase their stylistic flexibility. Choreography is powerful when the audience relates to the story being told through the dance. The steady increase of immigration in the United States since the mid 1940's diversified our population (Monger, et al.). People with different cultural backgrounds may relate to different stories, so dancers must be able to tell diverse stories through their movement to appeal to a large population. The creation of videoconferencing by IBM in 1991 allows dancers to interact with people with diverse backgrounds to gain the stylistic diversity necessary to engage diverse audiences ("Video Conferencing History"). Technologically focused projects such as the Triad Project inspire dancers to diversify their choreography. The Triad project connected street dancers from the UK, contemporary dancers from Portugal and Jazz and Ballet dancers from America on the platform Think.com which allowed them to share ideas for one dance through text and video. After months of preparation and the input of forty dancers, the finished piece incorporated all three aforementioned styles of dance. Sita Popat, an analyst of the project, reflected, "The social element was important, bringing together young people who would probably never be able to work together in any other way, and enabling them to share a

multicultural connection. This mutual peer group inspiration was an essential element in the creative process" (Popat). Without experiences similar to the Triad Project, the classes that a studio offers limits its dancer's knowledge of existing dance styles. For example, if a studio does not offer a Bollywood class, then the studio's performances may not appeal to members of the community who most relate to Bollywood dance. Dance exists in society today because it successfully communicated stories for thousands of years (Guenther). For dance to remain a prevalent aspect of society, dancers must gain stylistic diversity by interacting with dancers across the globe during their dance education.

Dancers must also interact with non-dancers in their geographic community for a positive dance education. Technology allows people with different backgrounds to connect easily, including those with different dance backgrounds. People who previously had no investment in dance can now experience it in many forms. Paul Sermon created 'Telematic Dreaming' where dancer Susan Kozel interacted with any non-dancer who wanted to participate through projection communication. Kozel remarks that during the improvised movement and choreography she built relationships with the participants. Many expected that the interactions would be dry, but after the experience Kozel reflected that, "Questions of privacy, intimacy, and identity were central… Some people became protective of me, and others…didn't want me to be alone in my virtual world. (Kozel)" This intimacy reflected in Kozel's movement, which changed depending on the relationship she built with each person. The emotional experience of 'Telematic Dreaming' changed her choreography permanently (Kozel). With developing technology, dancers and non-dancers also collaborate on choreography through websites. Stephen Koplowitz created the dance 'Bytes of Bryant Park' with inspiration from poems, short pieces of writing, exact movements and music submitted to him online by over sixty participants with no dance

background. Koplowitz and professional dancers performed this dance in New York thirteen weeks later (Popat). In both of these scenarios, people with no dance experience became interested and had the opportunity to interact with dance. Often people believe that they cannot participate in dance without classical training from a young age. Experiences such as those created by Kozel and Koplowitz disprove these stereotypes. At the same time, dance became more interested in the community outside of the dance world with the introduction of projects such as Telematic Dreaming and Bytes of Bryant Park. For the first time true experiences of many people outside of the dance world influenced dance choreography. The symbiotic relationship between dance and its community allows dancers to change their styles depending on the interest of society. This relationship is the lifeline of dance. If communities could not identify with dance choreography, performances would go unattended and dance would slowly fade into non-existence. To keep dance alive in society, dancers must use increasingly available technologies to interact with their geographic communities.

The recent technological revolution introduced possibilities for improvement to the field of professional dance education. Internet communications, self-reflection technology and motion modeling technology allow teachers to enrich their students with safer and diversified training. Less than twenty years ago dance education relied on the capabilities and opinions of dance instructors. Dance education changed drastically in the last twenty years along with the drastic technological changes of society. This trend indicates the potential for continuing change to the world of dance if society continues to develop at current rates. Research on light-emitting diode image projection technology allows thinner televisions, and introduced the potential for images to be shown on clear surfaces similar to glass (“Hidden Television”). This could lead to mirrors in dance studios which project dances during rehearsal so that dancers do not forget where they

are supposed to be, or what they are supposed to be doing. This could also lead to the images of dancers being projected onto a stage. Communities could experience traditional dances in the traditional theatre setting without the massive time commitment for dancers who, without this technology, often do the same show more than fifty times. No matter what technology develops in the future, dance will develop with society. This may result in increased access to performances because the same dance can be shown millions of times without dancers tiring physically or psychologically. This also may result in the death of dance all together. If new technology draws interest away from dance, the lack of funding will force studios to close. This cannot happen. Dance has connected people who have no other means of communication since pre-historic times, and without this connection so many relationships will be lost (Guenther). Dance studios such as Fusion Dance Academy must take it upon themselves to integrate technology into dance education not only for the benefit of their individual dancers, but for the benefit of society.

Annotated Bibliography

Leijen, Äli, et al. Streaming video to enhance students' reflection in dance education, Computers.

This source will be used to explain the correlation of the Feldenkrais method to dance technology. Dance reflection catalyzes improved self-reflection, and resultantly improved technique and safety. Increased accessibility to technology increases a dancer's potential to reflect on their movement, which supports the Feldenkrais Method.

Boykins M. Technology meets Accessibility. September 2011;65(9):24-26. Available from: CINAHL with Full Text, Ipswich, MA. Accessed October 26, 2013.

This piece explores the factors which increase a society's willingness to accept technology into their daily lives. These factors include physical accessibility and the human's innate need for

tasks to be completed in the most efficient way possible. I will use this information as a mode of showing why people incorporated technology into their everyday life as justification for the argument that technology changed society.

Dunning, Jennifer. "Solving Dancers' Health and Emotional Problems." *The New York Times*. The New York Times, 04 Sept. 1982. Web. 11 Nov. 2013.

This article supports the statement that dancers have physical and psychological difficulties due to dance which need to be addressed. This in turn supports the argument that motion-modeling technology must be used in dance education so that psychological and physical limits of specific dancers can be calculated to avoid these problems which are prevalent in the dance world.

Federico, P, et al. "Optimal control in individual-based models: implications from aggregated methods.." *PubMed*. 181. (2012): 64-77. Web. 28 Oct. 2013.

This article defines control-based models. Control-based models are created with a series of differential equations which derive the most efficient way of completing a specific task. This creates opportunities for choreographers to use computational dance to calculate the maximum potentials of dancers, and create movement based on those potentials.

Guenther, Mathias Georg. 'The San Trance Dance: Ritual and Revitalization Among the Farm Bushmen of the Ghanzi District, Republic of Botswana.' Journal, South West Africa Scientific Society, v30, 1975-76.

The information from this journal on the history of dance and its purpose in ancient times will be used to show that dance changes with societal developments. This will show that dance has changed because of the recent technological revolution, as well as frame the argument that dance will continue to change in the future if society continues to change.

"Hidden Television." *Mirror TV*. N.p., n.d. Web. 11 Nov. 2013.

This source is an example of mirror televisions made possible with developing technology. This information will be used to support an example of how dance might develop in the future.

"History of Computers." *Computer History Museam*. N.p.. Web. 27 Oct 2013.

This piece outlines the history of computers, and supports the argument that technology changed in recent history. With this foundation, all of the proceeding arguments based on changing technology will be more justified.

Midgelow, Vida. *Reworking the Ballet: Counter-Narratives and Alternative Bodies*. 1. New York: Routlegde, 2007. 24-36. Print.

I will use this article to look at how society influences dance choreography when they have the means to interact with it. Specifically, how the changing openness towards varying gender identities has changed dance choreography will be analyzed. Also, this text will be used as evidence for a more general impact of society's condition on choreography.

Monger, Randall, et al. United States. Homeland Security. *U.S. Legal Permanent Residents: 2012*. 2013. Print.

The immigration trends discussed in this report will be used to show that the diversity in the United States increased in recent years. In turn this information will support the statement that diverse dance styles in choreography are necessary create connections between dancers and their geographical communities.

Nahrstedt, Klara, et al. "Computational model of human creativity in dance choreography." Urbana 51 (2007): 61801.

This article explores how computational dance can be used to model and maximize the potential of dancers. This model is not commonplace yet, however it has the potential to revolutionize dance choreography by creating movements dancers are capable of by inputting data about maximum flexibility, stamina, and muscle power. This will add entrancing components to choreography, improving it drastically.

Popat, Sita. "Interactive Dance Making: Online Creative Collaborations." *Digital Creativity*. 12.4 (2001): 205-214. Web. 28 Oct. 2013.

This article will be used to explore the online collaborative choreography between three professional dance groups with three different ethnic and dance backgrounds. The communication online over the course of months resulted in a dance which encompassed the jazz and ballet backgrounds of the American dancers, the street dance background of the dancers from the United Kingdom, and the contemporary background of the Portuguese dancers. This resulted in a diversified dance. With the technologies the internet allows, dancers continue to learn and add to their repertoire, in turn creating more interesting pieces.

Popat, Sita. *Invisible Connections: Dance, Choreography and Internet Communications*. New York: Routledge, 2006. 48-65. Print.

I will use this source to look at the tree main interactions of people with dance through technology: the use of online animation to choreograph simple dances, the connection of choreographers across the world to people for performance purposes, and the use of videos to involve the general public in the creative process of choreography. Through these modes, dance choreography is outlined more precisely, diversified by incorporating a variety of cultures, and making dance choreography reflect the interests of the general public.

Sulcas, Roslyn. "Joffrey Re-embraces the Contemporary." *New York Times*. 12 Feb 2012: n. page. Web. 12 Nov. 2013.

This source shows how the Joffrey School of Ballet embraced contemporary forms of dance by hiring a choreographer who integrates technology into his curriculum. This set a precedent which other studios must follow.

Susan, Kozel. *The Routledge Dance Studies Reader*. New York: Routledge, 1998. 81-89. Print.

I will use this book to look at the emotional response of the general public when interacting virtually with a dancer through a program called Telematic Dreaming. The emotional response of the dancer will also be investigated, for her emotional response propagated a change in her improvisation techniques. This is another mode of showing how when the public has more available access to dance, choreography changes.

"The Feldenkrais Method." *International Feldenkrais Federation*. N.p.. Web. 27 Oct 2013.

The Feldenkrais method is the method developed by Moshe Feldenkrais of teaching movement through understanding the anatomy of the human body. This method has shown to prevent injury in athletes. Apps developed in this technological revolution have helped dancers achieve safer and more fluid movement, which has improved dance choreography. Reflection of movement has also been furthered with video streaming allowing dancers to review their movements.

"Video Conferencing History." *Nefsis*. N.p.. Web. 27 Oct 2013.

This source outlines the history of video conferencing, and the impact it has had on communication. This will be used to show the development of video conferencing so that the argument that 'developing international communication has diversified dance choreography' can be made. This argument will feed into the overall argument that the development of technology has improved dance choreography through diversification, and increased precision and input.

"What is aerodynamics?." *NASA*. N.p., 3 Sep 2013. Web. 27 Oct 2013.

I will use this source to define aerodynamics. It is important to have aerodynamic form in dance. Technology such as Kinesiocapture helps in finding this form. How Kinesiocapture has helped dancers improve technique shows that technology has improved dance choreography.

Xu , Qiaobing . "Top-Down Nanofabrication." Intro to Biomedical Engineering. Tufts University, Medford. 9 Sep 2013. Lecture.

The information about Moore's Law taught by Professor Xu will be used to look at the projected growth of technology. Moore's Law states that every two years, the number of transistors in a given area will be capable of doubling, showing an intense growth of technology probable in the future.