THE FOURTH EYE IN THE FOURTH WALL:

Using digital imaging to enhance the studio practice and performance of Dance.

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By Bill Hill

As dance education in the 21st century strives to build the complete artist they must take advantage of the multitude of eyes available. The first eye that a dancer sees is their own. By looking into the studio mirror and watching the grace and line of movement, they begin to critique and evaluated the discipline. The second eye watches from a slightly more distant vantage point; as the instructor or choreographer applies critical inspection through both a physical and historical lens. The third eye is the audience watching from inside Plato's cave, gazing through the fourth wall with a perspective framed by cultural and personal viewpoints. And now, the forth eye brings a more analytical and detailed perspective that the other eyes can see through. This is eye, the camera, records and preserves, speeds up and slows down, compares and contrast. As a tool in dance it can provide insights to form and function in both an asynchronous and synchronous manner to be leveraged for better control and command of the body as an art form.

Amy Baker Schwiethale and Ella Ben-Aharon in the Baryshnikov studio at White Oak Plantation.

The first know constructed reflecting surface dates back to 6000 b.c.e. when obsidian, a naturally formed volcanic glass, was polished into a mirrored surface. Every culture since has formed a version of these reflecting surfaces until metal-coated glass was perfected in the early Renaissance. The use of mirrors in the dance studio has been a long and treasured asset for both instruction and performance. According to the Randall Qualitative Questionnaire, overwhelmingly dancers find benefit through the mirrors, from better understanding of concepts to assisting with timing and alignment.[1] Over 8000 years later we are debating the impact that such reflection has on body image, both positively and negatively. But there is no doubt that the mirror has the ability to place you outside your body, which places more focus on looking than feeling. There are benefits and drawbacks to the mirror in the studio. But as instruction is moving away from more traditional means of corrections, due to increased limitation of physical contact between teacher and student, the "mirror" has become more central to self-correction in contemporary studio practices.

The reflection becomes an extension of the studio, a new space the dancer occupies, both familiar and unfamiliar. Michael Foucault, in his text *The Order of Things*, refers to these spaces that disrupt conventions of order as "heterotopia". Heterotopic sites seem familiar, as they are subsumed within a society's conventional ordering system that links them to other sites, yet they are unfamiliar in that they simultaneously contradict the premises by which these relationships are sustained.[2] Therefore the complexity of these visual devices destabilize the seemingly straightforward transcription of real space and create not only an inverted but parallel space. Mirror imagery surfaces again in Foucault's discussion of *aemulatio*, the idea that patterns of resemblance can occur between things despite the spatial distance separating them: "There is something in emulation of the reflection of the mirror: it is the means whereby things scattered through the universe can answer one another." Of course, the problem is which is the reflection and which the reality? Foucault responds by stating that "emulation is a sort of natural kinship existing in things; it arises from a fold in being, two sides of which stand immediately opposite to one another."[3] As a result, multiple 'realities' are juxtaposed. It is even more intriguing that Foucault explains the importance of the mirror in uniting these realities. In his essay "Of Other Spaces," Foucault expands upon the complex relationship between mirrors and space, describing mirrors as unique sites in which the fictive space of utopias and the real space of heterotopias converge. The mirror is a utopia in the sense that it projects a virtual space behind its surface, a space in which the observer is misperceived as being present.[4] Conversely, the mirror is also heterotopic due to the oblique manner in which it affirms the observer's position in real space: "it makes this place that I occupy at the moment when I look at myself in the glass at once absolutely real, connected with all the space that surrounds it, and absolutely unreal, since in order to be perceived it has to pass through this virtual point which is over there."[5]

While Foucault challenges the reflection as an alternate structure that stand in binary opposition to the "real", Jacques Lacan finds the mirrored surface both external and affirming. In his theory of the mirror stage, a child encountering a mirror realizes that he or she has an external appearance. From a psychoanalytical perspective prior to this recognition the "I" of identity is a primordial form, but afterward it is objectified in the dialectic of identification with the other. From here language works to restore them into one universal subject.[6] At this moment in a child's development, they recognize themselves as a unified image, as a whole self. Once this occurs the child will no longer see the reflection as projected other, but rather it projects consciousness into the image and transforms it into "self". Lacan argues this is one of the first independent actions of a child, while still nursing, unable to walk, and prior to language; they place consciousness into an external image that they control and see it as perfection. Later this ideal will add tension to the self as something that can never be matched, a fiction to be lived up to, while creating a desire to be whole with the other. Although we sometimes feel alienated from our "self" we see in the mirror a unified whole. Lacan goes further to say that after this mirror stage we see the entire world as individual whole objects that are uniquely and distinct.

For dancers the mirror has a long and stable place in their practice. It is fostered from the first moments of walking to the studio. It is a cornerstone of the ideal, along with the barre and the floor. It is certainly beneficial for checking where the head should be, correcting arm and leg levels, and for assessing line. This becomes even more important in a contemporary society that increasing expresses concerns over personal space and body issues. Where teachers were once free to physically manipulate the dancers body by touch and pressure to promote the internal feeling of form, now they are increasing driven to rely on verbal commands and visual demonstration. The mirror serves as an effective space for dancers to work toward matching the ideal. Additionally, the reflection of the mirror aids in the timing and synchronization with others dancers and provides instant feedback, which the dancer reacts to immediately. The studio mirror has its place and purpose for dancers to examine, express, and embrace.

But once there, how do you strive to get the dancer to move inside the body to feel the movement rather than relying on the visual feedback that is synchronous with the actions they are making. When coupled with the flattening of the physical space by a two dimensional representation in the mirror, dancers are left with a fixation of the other self, the ideal self, which can never match reality. The image lingers as one reflects on the self. It can become a flat space and an isolated moment of time. The attention becomes focused on one point in isolation, one moment of time. In the field of dance, poses are important, but the movement between them is just as important. Dancers need to break through the construct of the reflection in the mirror and live inside the body. They need to engage the three dimensional space of the real, and interact with the others or the empty space directly. They need to break down the glass mirror and engage with a live audience that is watching with a different gaze than the mirror.

Sabi Varga and Whitney Jensen bring "Afternoon of a Faun" to the dance studio.

The studio practice is a valuable and important space for dance to engage, but as an art form it is vital that an audience is also engaged. Traditional methods of communicating with dance are constantly being challenged, both in form and space, with practices like site specific, in the round, and tele-immersive approaches, however the staple of live performance remains proscenium concert dance. Therefore, studio practice needs to work, as diligently in the performance space as in the practice space, and dancers need training without the mirror. This is not a new concept or issue for the dancer or choreographer. Jerome Robbins creatively wrestled with this dynamic in his work *Afternoon of a Faun*.

> *"Mr. Robbins has choreographed a shyly amorous encounter between two dance students.*
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> *The way the handsome Mr. Edwards kept gazing into an imaginary mirror indicated that he was much concerned with his image and more than a little pleased with it. Yet his confident air masked uncertainty for, after he dared to kiss Ms. Tracey, he did not know what to do next.*
>
> *Ms. Tracey was also concerned with the mirror, and she admired her cool beauty in it. She appeared self-possessed, but she, too, was left confused by that kiss. Both dancers convincingly portrayed young people blessed with good looks, but with little worldly experience. The ballet's erotic nature was emphasized by the way the orchestra, conducted by Hugo Fiorato, made Debussy's score swirl like perfume around them."* [7]

This work not only highlights the audience as voyeur, but also investigates the role the mirror has in the self critical and often narcissistic world of the studio. It exposes the fourth wall with a brechtian staging of the mirror and reminds us that performance space changes the gaze from one of self to other.

Lacan's investigations of psychoanalysis lead him from the mirror stage to the gaze, which describes the anxious state that comes with the awareness that one can be viewed. He goes on to articulate that the subject, in this case the dancer, loses freedom and control once they become aware of being watched. Lacan's gaze is a "preexisting gaze, a kind of staring at us by the outside world" and also a gaze which is "neither apprehensible nor visible, a blind gaze which is erased from the world". [8] For example, the spotlight helps the audience focus their attention upon a particular dancer or movement, also highlighting the fact that something behind the spotlight determines where and what the audience is suppose to perceive.

We can consider the gaze as a split. In this split, the subject, or the "I "(Dancer) of the equation, can — see only from one point. But in the other side of the equation, (Audience) projects to the "I" that they are looked at from all sides. While one might believe that the gaze would be associated with the eye, in Lacan's world, it is not. As Zizek points out, the eye viewing the object is on the side of the subject, while the gaze is on the side of the object. When I look at an object, it is always already gazing at me from a point at which I cannot see. [9]

The fact that I (the subject) am being looked at from all sides, particularly from a place where I cannot see it, should be disturbing to the dancer who previously has had complete control of the viewer in the mirror. This gaze can be a violent and unsettling thing. For example a woman might be made to feel uncomfortable by the unwanted leering of a male stranger. Once she begins to feel uncomfortable, then the gaze creates a hostile environment for her.

The dancer that the audience sees on stage reflects reality, but it isn't real, in the sense that it is "staged". The audience sees it in a darkened room on a stage that is bordered with black and framed by the proscenium. This dark room could be compared to Plato's darkened cave. Plato describes a group of people who have lived chained to the wall of a cave all of their

The Allegory of the Cave

lives, facing a blank wall. The people watch shadows projected on the wall by things passing in front of a fire behind them, and begin to ascribe forms to these shadows. The shadows are as close as the prisoners get to viewing reality. Suppose that a prisoner was freed. If someone were to show them the things that had cast the shadows, they would not recognize them for what they were and could not name them; they would believe the shadows on the wall to be more real than what they see. The stage itself functions like a mirror of sorts; it is a mirror that reflects a reality prescribed to the audience by the choreographers and the dancer.

The forth wall works two ways. The dancers also projects through the facade and connects with the audience. Once this gaze is captured the dancer is both in control and without it. How do they respond to this shift away from the full control and judgment of the mirror? As performers, they must practice within their bodies and away from the mirror to train their senses to experience the body from within. To develop a space and place protected from the gaze, where they are free to express through movement and form.

> *"Stephanie Saland, a former New York City Ballet principal, says of her days at the School of American Ballet, "I used the mirror to keep up with the steps when I couldn't remember an exercise. I began dancing quite late and did not retain sequences easily." Saland believes that if the mirror is not used carefully, its detriments can outweigh its benefits. "Dancers are often their own harshest critics," she says. She believes the mirror can reinforce this dynamic of unforgiving self-evaluation, creating a distorted viewpoint. "The mirror reflects how things appear," she says, "and the student can have a constant self-dialogue in response to what they think they see, and whether it measures up."*
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> *According to Saland, using the mirror incorrectly can shift the focus of movement and alignment from an internal experience to an external one, where the dancer begins reading her progress (or lack of it) from a flat sheet of glass, rather than from what she feels.*
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> *Saland believes dancers need to nurture their sensory awareness and learn to trust their feelings, rather than relying on the mirror. "Students need to develop a connected sense of 'right' that is honed with the inner eye," she says. "The dancer needs to shift to a feeling state and learn firing patterns and movement qualities that come from an 'inner seeing.'* [10]

As dance instruction evolves it cannot ignore the evolution of both cultural and technological modifications. As noted, the impact of culture issues with the body has impacted the method of interaction that a teacher has with physical correction of form. Dance education, should seek to not only protect the craft of form, but also the artistry of movement. The mirror can be an invaluable tool to assist dancers, but relies on two-dimensional representation and a single perspective, which draws the dancer outside their body. Removing the mirror can provide the dancer with a visual void to promote feeling and allow the dancer to move inside the body. Neither, however, prepares the dancer for the gaze of the third eye nor the analytical perspective to deconstruct the lived body experience.

Just as the progress of glass technology advanced, so too has the mirror itself, by presenting a more "authentic" reflection of the body. Today, we would be hard pressed to classify the mirrors in our studios as instructional technology. Instead we would look toward more recent advantages in electronic technology that feel more removed from the traditional space. Similarly video technology has its root before the Common Era. In the first century BC, a zoetrope-like optical device was invented by the Chinese craftsman Ding Huan that created the impression of motion from the rapid movement of static images. When this device with painted images was rotation it would create the illusion of motion. [11] Two thousand years later, British photographer, Eadweard Muybridge, developed the first photographic representation of moving pictures. Hired by Leland Stanford, to settle a bet on whether a running horse ever had all four legs lifted off the ground at once, Muybridge set up 24 stereoscopic cameras along a track parallel to the horse. Each camera shutter was controlled by a trip wire, which was triggered by the horse's hooves. They were 21 inches apart to cover the 20 feet taken by the horse's complete stride, and ended up taking pictures at one thousandth of a second. [12] This experiment not only proved that a horse does indeed take all four hoofs off the ground, but that they do so with the hoofs tucked

underneath the horse's body. Muybridge continued to advance photographic studies of moment by creating series of photos of the human body in motion. Once these sequential image where printed and flipped through at a constant rate the still image began to appear as a moving image.
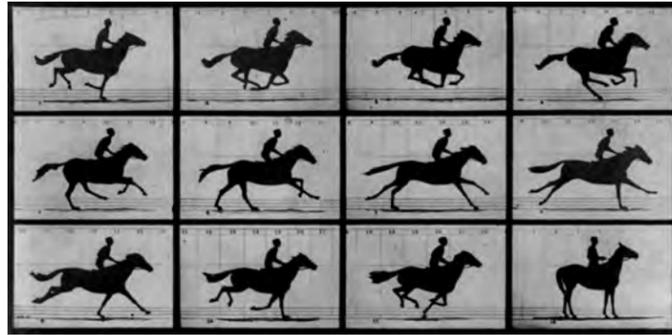

The Horse in Motion, by Eadweard Muybridge, 1878

The ability for us to seeing moving images like this was first based on a concept called persistence of vision, which is an optical phenomenon where the mind forms connections to conceptually complete the gaps between the frames or pictures. "In effect, this concept keeps the world from going pitch black every time we blink our eyes. Whenever light strikes the retina, the brain retains the impression of that light for about a 10th to a 15th of a second (depending on the brightness of the image, retinal field of view, and color) after the source of that light is removed from sight. This is due to a prolonged chemical reaction. As a result, the eye cannot clearly distinguish changes in light that occur faster than this retention period. The changes either go unnoticed or they appear to be one continuous picture to the human observer."[13]

Muybridge continued his exploration of photographic studies of movement at the University of Pennsylvania using elaborate banks of cameras to analyze both animal and human motion. He proceeded to take over 100,000 photographs that broke down a variety of movement and actions. In 1887, some of these images were reproduced in his major publication, *Animal Locomotion*, which had a tremendous impact, both on scientists and artists of the day and for years to come. "Muybridge's work contributed substantially to developments in the science of biomechanics and the mechanics of athletics. Some of his books are still published today, and are used as references by artists, animators, and students of animal and human movement."[14] These photographs where both printed as image sequences and displayed in his zoopraxiscope.

The zoopraxiscope, is considered to be the first movie projector, and projected images from rotating glass disks in rapid succession to give the impression of motion.

As this technology advanced it became clear that the speed of the projected image could be altered, which changed the viewing and interpretation of the images being viewed. This technique has been used widely in films to increase tension and focus of action, in athletic events to demonstrate skill and style, and in documentaries to show something not observed by the naked eye, like the drop of water. Dziga Vertov, a Russian film maker in the late 1920's is credited with first embracing slow motion as a structural part of filmmaking with his film *Man with a Movie Camera*. Ironically this film is considered a documentary with no story and no actors. It examines culture as if it was a human form.
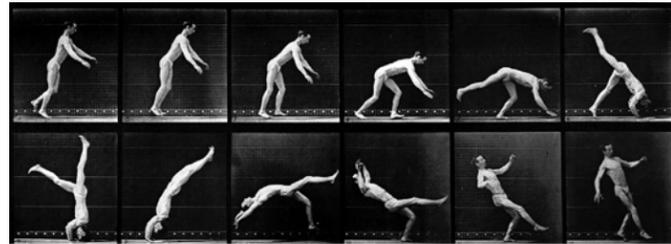
Head-spring, a Flying Pigeon Interfering, by Eadweard Muybridge, 1885

Dance became connect with the development of film with the 1896 feature, *Serpentine Danc*e, by the pioneering filmmakers Auguste and Louis Lumière. The film recreated the burlesque style of dance by Loie Fuller. The replication of the form through this medium transformed the world. Fuller went on to develop and support dance movements, including U.S. born Isadora Duncan. But it wasn't until another Russian; saw the value of film to examine form. Russian dancer and pedagogue Agrippina Vaganova, who is best known for developing what would become the standard for Soviet ballet instruction as well as most of the world: the Vaganova method. She also published *Basic Principles of Classical Ballet* in 1934, which would become the industry standard for ballet training around the globe. She was "an indifferent soloist as a performer and an arch-conservative artistically but an inspired teacher who, assisted by the dance historian and theoretician Lubov Blok, introduced analytical thinking into the grueling mastery of ballet technique. Rather than exhorting her pupils to jump "higher" or to move "faster", Vaganova taught them to identify

the muscles involved in producing a given effect."[15] Along with her approach to develop the whole body to create harmony, she embraced and used film as a tool to break down and interpret movement and form. Ironically, by examining each component of the body in detail she developed the Vaganova system; a method that did not isolate one particular part of the body, but trained it into one harmonious whole.

Technology has evolved to include Biomechanics in the training process. Biomechanics is "the scientific discipline that studies the mechanical principles of human movement and provides information on muscular function and its characteristics."[16] As this type of analytical data is collected and examined more insights will be provided to assist in the development of the human motion. This has evolved quickly from the time lapse photographs of Eadweard Muybridge to digital motion capture of every joint in real time and space. It is being used in Parkinson's research to improve stability, and in Athletic training to increase performance, but how can it provide more artistry? As we look towards tools to advance the discipline, we must be mindful of the expressive nature of art and it connectivity with humanity. Technology needs to be accessible, referential, and interpretative as a tool for dancers and choreographers to use toward their creative voices.

In 1955 during a CBC broadcast of a Canadian hockey game, the first televised replay was aired. A few years later, ABC aired the first slow motion replay and few years later CBS gave birth to the instant slow motion replay. This changed the way live events where viewed not only by the audience, but also by coaches and athletes. Initially this technology was limited to a very few, but today the use of video analysis and biometric feedback to train is no longer limited to high-end research institutes or Soviet Olympic teams. With increasing computer speeds and decreasing pricing, consumer technology is now wide spread and affordable. By far the greatest advance at this time is the availability of "digitizing" equipment that interfaces directly with desktop computers. Rather than the hand tracing of images frame by frame, this new equipment permits frame-by-frame manual measurement of the location of objects or points on the human body, such as the hip, knee and ankle. This technology, called Video Motion Anaylsis VMA), allows for documenting, tracking, evaluating, and comparing photographic

representations of athletes performing from a variety of angles. Once this footage is captured it and can be broken down into frames to measure. Furthermore, this photographic footage can be overlaid with graphical markings to evaluate each component of the body in motion. Coaches and trainers analyze video from live action and training exercises, and the results of their careful analyses provide helpful feedback for the athletes. This feedback can both increase performance and inhibit injuries. Additionally this video technology can be used to compare master form with specific individual form side by side. Furthermore, it can be used as a structural analysis of the entire movement of a team to breakdown how each player works within the overall plan. Dance as an art form should also be using this accessible technology to educate and train.

The typical technique is to begin with capturing video of motion. The best method is to use a tripod to steady the camera and to record the action. The higher the resolution of the camera, the better image quality. Once this video is captured digitally it can be processed by a number of software programs to slow down, speed up, or freeze the tempo of the action. Additionally, the footage can be drawn overtop of with either graphical tools or have a grid applied over it so that each step of the movement can be interpreted. Once edited this footage can be compared to other footage side-by-side or overlaid. The video can be viewed, distributed, and/or archived for future comparison. It can measure the tempo of action, balance, gait, alignment, etc. This technology can be used for individuals seeking to improve mechanics or for the entire team to break down the interaction between players.

Although there are much more complex systems and applications that will advance biomechanics and science, our goal is artistic analysis of movement with cost effective accessible technology. Today video technology has evolved to where it is a built in feature of a cellular phone, a device a majority of dance student carry with them everywhere they go. It has become commonplace and possibly less expensive than a mirror. When used in the studio and/or theatre these digital cameras have the ability to collect data that can be used in a variety of methods and formats. In the dance studio/theatre the first concern is lighting. It is very important to have even bright light throughout the space with a little distraction as possible in the

Brian Palmer working with Tiffany Fish using Ubersense on a IPad connected to AppleTV

background. The next priority is the camera placement and stability. A good tripod is vital to control the image quality and position. Most consumer digital cameras fit a basic tripod mount, but even if you are shooting with mobile device, like a phone or tablet, there are inexpensive tripod mounts for fewer than 50 dollars that are great resources for capturing a stable image.

Once the camera is stabilized, a decision needs to be made on the placement of the camera. This depends on the purpose of the analysis; to examine the form of a particular dancer it is best to shoot from the front and/ or side position of the dancer with the camera height being equal to their waistline. If the intent is to evaluate the choreographic composition of a work, then either a front placement or ceiling placement directly centered over the space is best. After the recordings are complete there are a variety of options for playback and analysis.

From here, there are two basic approaches to work with in the studio/theater environment. **Method1: Instant Feedback**. This format allows instantaneous feedback and playback of the recorded dance in the studio. Using a tablet or phone, one can quickly capture a digital video and replay it. There are two basic additions that make this process more educational and effective. 1) Display size: since most screens on mobile devices are small and the image resolution is limited, consider using a monitor or digital projector

to enlarge the screen size. This can be accomplished by physically connecting to the device with a cable *($35.00)* or can remotely be delivered via a Bluetooth connection with an Apple TV device *($99.00)*. 2) Analysis tools: once the video is on the display, adding technology to be able to control the playback speed and draw over the image is highly beneficial. There are an increasing number of apps being developed to assist movement analysis for coaching of this type. The one currently most applicable to dance is *Ubersense (free)*. It allows you to record video and play it back in slow motion. It also has a number of drawing tools to inspect alignment and position. Furthermore, it allows you to playback two videos side by side to compare. **Method2: Detailed Analysis**. This format requires more time and technology, but allow for more in depth analysis and more flexibility to work with multiple cameras. In this process, it is recommended to use a higher resolution camera than the ones that come on your mobile devices (but those will work). Once the video is captured it needs to be transferred to a computer. From here there are a number of video applications that will aid in the interpretation of the footage. By using IMovie, which comes with every Macintosh computer *(free)* or using more advanced editing software packages like Adobe Premiere *($299.00 per year)* you can apply custom grids over the image, zoom into specific areas of the footage, and sync both a side view and front view to compare the movement in space. This can then be rendered out with a voice over narration that can be shared with the

dancer or ensemble. One other tool to be considered to streamline this type of offline evaluation is a screen recording software program like *Camtasia* or *Snapz Pro (under $100.00)*, which can quickly render a video of your screen activity and the audio capture from your live microphone. Either of these approaches can also be applied to the entire choreographed work or focus on a specific section or dancer.
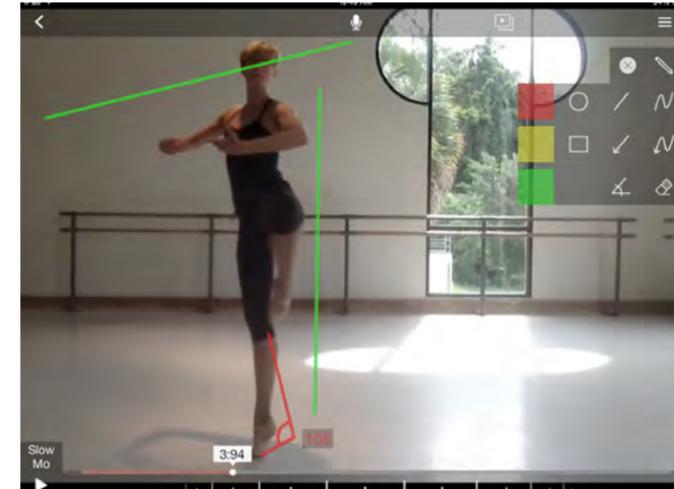
Screenshot of Ubersense interface with Tiffany Fish

Brian Palmer, Chair of Theatre and Dance at Jacksonville University has embraced the use of VMA in his pedagogical approaches to all forms of dance, both to breakdown a particular dancers technique and to analyze the work of choreography. "It is extremely important that dance continue to push forward using all available tools at our disposal," Palmer says. "We encourage dancers to work in front of the mirror, then close the curtains and feel the movement, but also to use VMA to become more analytical in the creative process to examine the scope of their form." Jacksonville University dance program has been using video technology for the past 10 years to analysis and document the progress of their dancers. With the recent addition of a low residency MFA program in choreography the use of video technology to instruct in a multitude of methodologies has grown significantly. This includes students submitting work electronically and having the work analysis and critiqued electronically with voice-recorded assessments.

Regardless of which method used, it is important to remember that goal is critical analysis to reflect on and evaluate their own and others' form to foster growth as an artist. Through the asynchronous examination of a perspective outside of the mirror, the dancer or choreographer is able to step outside of their own space and

time to see from a new perspective. Furthermore, it demystifies the gaze of the audience through practice of being watched while in the studio with the fourth eye, the analytical eye of the camera. This technology can be inexpensively added to the studio environment and will coupled with technique practice in front of the mirror and with the mirror covered, it provides the dancer or choreographer time to reflect more analytically on the decisions and movements. This fourth eye, a digital mirror, will not only reflect the movement, but also will deconstruct it, allowing dancers to fine tune their form and artistry.

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