

ART AND SCIENCE

Using Technology to Visually Represent Time, Slow Shutter Speed Photographs



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Figuring out the role of technology in early childhood education and how it can be used as a form of art making is the focus of my study. Research and lessons as examples of technology being used as an art-making tool, was completed at Hort Woods, a state-of-the-art preschool, situated in the middle of the Pennsylvania State University. It is here where the focus remains centered on “the artistic and conceptual practices of young children” (Schulte, 1). The philosophy of the center is “children learn through play and exploration of their environment while engaged in relationships with peers and responsive adults and is key to how the children learn” (2012). Children at Hort Woods have the freedom to interact with others, collaborate with a peer, join a group or explore alone. It is through individual and active play that learning and development takes place. At Hort Woods all aspects of the child are of top concern, the physical, the social, the emotional, and the cognitive all require and get a hands on approach. The focus of my research was to teach technology to the children, while focusing on a specific lesson plan and let the technology play a role in the art that they create, using the most up-to-date equipment. Technology used appropriately in the classroom should enrich, expand, and extend the overall curriculum. How Students are able to use technology and what they are doing with it, will help me as I begin to focus my research in the direction of ‘technology as a sketchbook’.

A sketchbook as we know it is a book or pad with blank pages that an artist uses to draw or paint as part of their creative process. Using technology as a sketchbook is a way of documenting the creative process in different and very unique ways. A chance to capture art over time that can be keep as a journal, shared with others within the classroom or shared via internet. New technology has made it easy to mix traditional and digital images all in one place to use later for inspiration or discussion. These lessons lead to an insight of understanding how children think, along with understanding that nothing can be expected. With the ever changing dialogue, it was always important to be a good listener and facilitator of questions. During my research I concentrated on children three to five years of age.

Lev Vygotsky stressed in his research that “every function in the child’s cultural development appears twice: first on the social level which is between people and later, on the individual level which is inside the child” (Asiado, 2009). Focusing on the work of three to five year olds, my research goal was to look at the relationship between technology and curriculum development. As I worked with the students in small groups I had a chance to watch Vygotsky’s theory play out. At first the children listened intently as I explained and showed them what we would be doing as it pertained to science, art, and technology. Their minds and eyes watched in amazement as they participated in the lesson multiple times. As we repeated the lesson, his theory was again tested when the children were able to let their individual inner voices speak. This happened as they gathered information from prior lessons and constructed their own theories about the out-

come or how they would try to influence the outcome through manipulation. Vygotsky work, *Thought and Language*, “explores interrelationship of thought and language. He goes on to argue that thought is originally non-verbal and language is non-intellectual. The separate curves of thought and language development only meet at around the age of two, at which point thought becomes verbal and speech becomes rational” (Asiado, 2009). The children included in my research were past the curve and were capable of communicating not only verbally, but also rationally. Working with this age group allowed the children to draw conclusions about their observations individually and express them verbally with rational.

Technology in early childhood learning is not to be used in place of the teacher in the classroom, but should be used to enhance the child’s learning, while simultaneously allowing them the opportunity to be exposed to modern technology in a tech savvy world. Finding the right curriculum is key to success, especially when working with very young students. Looking at different lessons completed, it isn’t about the final product that is important as it is about taking a closer look at the process of how the student got to that final work of art. Children want to explore and ‘play’, and we as adults need to allow this. Brent Wilson stated that children don’t think of themselves as artist. He said, “perhaps one day they will be, but for now art is a form of play” (Wilson, 3).

Seeing the potential for camera’s, one lesson was to take using cameras a step further. Taking a small groups of children into the messy art area in the classroom where the tripod was set up, along with the shutter release button, a bucket of water, eyedroppers, and some liquid water color, the students were ready to start combining art, science, and technology. The children combined science and the arts by taking slow shutter speed photographs of color in water. Students learned about how the camera works and were able to see a tripod, a shutter release button, and how they are able to work together to take longer photographs. Letting the children lead how we would do the experiment, I asked them if they wanted fast or slow pictures. Part of the process was just watching and being able to see all of the colors combine over time and hearing what they thought the water was doing! The photographs were taken on the ‘S’ setting of a Nikon D7000 camera and ranged in shutter times. The materials used ranged from low-tech eyedroppers, liquid watercolor, and a very high tech camera. The children were each given an eyedropper that they used to drop liquid color in a container of water. As the color incorporated into the water created a multicolored swirling abstract drawings. The results was a constantly changing piece of art that by capturing it on camera at different speeds allowed the results to be reviewed over and over. Seeing time visually through this experiment was the backbone to the project, but it evolved into a drawing when the students decided to dictate how the colors should mix and advancing the process by swirling the water with their eyedroppers or fingers.

One student’s comment , “I want to do this all night” was echoed by other students as well. This was definitely a hands on project that will allow us be to go back and discuss the “How, why and what” they think would happen if we continued. With the science experiment captured in photographs the opportunity to reflect with the children during the lesson, but allow us to also reflect at a later date and time. Completing this lesson numerous times, allowed for the

project to evolve. Working with a light table allowed for the students to create longer drawings and see more of what was happening over time. Exploring the thoughts of creating potions, seeing sea creatures, and looking for various object like time spent cloud watching, the students always had different comments. Trying to get the same effects to repeat themselves like making bubbles or rings of colors, was all about trial and error.

Technology is constantly changing and so is the age group being exposed to it in the classroom. Just as sketchbooks provide a bounded space for personal exploration, so does the use of technology. Given the chance to interact and dialogue with the children should be no different than if they were using a sketchbook as their medium. The child is still able to create and use their imagination. Interaction with teachers, peers, and the classroom environment are constants. The art that young people create mirror how they think, it is up to the teacher to get down to their level and hopefully be invited in. We call it child's play, Brent Wilson said, "it takes only a stub of a pencil and scraps of paper to make worlds without end, create man in any image, realize dreams, and possess what one wishes, all for the price of a pencil" (Wilson, 4). With a camera, a computer, the click of a finger or a tap of a stylus on an iPad, creativity and imagination can take child's play to a whole new level.



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Art Education, Vol. 27, No. 8., pp. 2-9.

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Slow Shutter Speed Photographs

This lesson was created for Hort Woods Childcare Center, children ages 3-5 years of age.
Lesson can be modified based on age of children.

Unit Rationale:

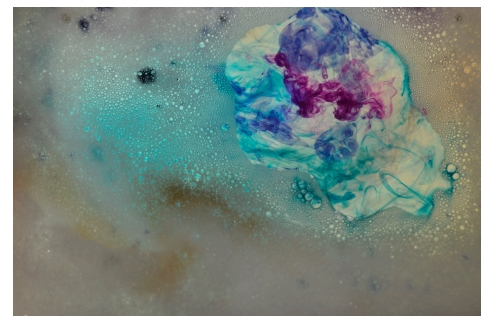
Students will be looking at cross-curriculum ideas in the unit Art and Science. These lessons will embody the use of technology to capture time visually. Sensory play will be explored through various mediums. Cooperative learning is an effective teaching method and repeating the unit several times will allow the children time to reflect on the results and possibly collaborate on how they feel they can alter the results the next time.

Lesson Rationale:

Sensory play will be encourage to have the children engaged in the process and manipulating the results of the photographs taken. Experimenting with time and understanding how a camera work in a simpler version will show rather than tell the children how the camera works. Manipulating the process will engage the students while capturing what the are creating through the camera lens.

Learner Outcomes:

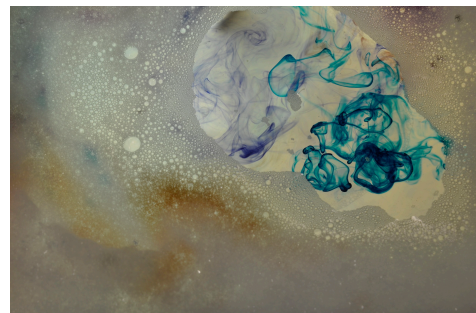
Students will gain an understanding of the process of art making, along with manipulating the camera to take photos at different shutter speeds. Seeing time in a vibrant visual form will instill in the children how art can convey time and be used as another drawing form. Exploring science through art making will create an overlap of interdisciplinary exploration as students engage in drawing with water. Children are natural scientists and their curiosity leads them to try to make connections to what they are doing. The children through this project will experiment, explore, learn about observation, and participate in a science project, all while they interact with technology documenting the art they create.



Materials Needed for Lesson:

TEACHER MATERIALS

- Gather materials for students to use
- Optional: Light table



- Camera/videocamera for documentation

STUDENT MATERIALS

- Clear bin/bucket
- Eye droppers
- Liquid watercolor
- DSLR camera/ camera with an 'S' setting
- Tripod
- Shutter release button (to prevent blurring of the photos)
- Smock
- Optional: add soap when filling up the clear bin/bucket with water

Teaching - Learning Processes:

STARTING THE LESSON

The teacher should prepare the set-up for the lesson by placing the camera on the tripod with the shutter release button attached. Setting the camera to the 'S' setting and roughly setting the ISO, light setting, and aperture so that the students will be able to change the shutter time throughout the lesson. Clear bins should be filled with water and then placed on the table surface or on a light table for ample results. Experimenting with hot or cold water changes results of how the watercolor will change. Placing various colors of liquid watercolor into the water bin using one eye dropper per color is suggested to prevent minimal mixing of colors.

Students will be taken into the messy art studio in groups of 3 - 4 students at a time. Each student should roll up their sleeves and place a smock on before engaging in the lesson. Students will be introduced to the art and science lesson by the teacher first asking how the camera works. To help the children get a better understanding the teacher can demonstrate by having the students listen to the camera when the shutter release button is clicked. Demonstrating that the camera is like an eye and having the students close their eyes until they hear the first click of the camera, opening them, and then closing them on the second click, the students will visually see what happens. Next, the teacher can prompt the students by asking if the camera should take long or short photographs. Showing how to change the shutter times, the students can then experiment and think about how changing the shutter time will help to create over or under ex-



posed images. Talking about the differences, the students can then decide what image result that they would like to see prior to proceeding.

Showing the students how to use the shutter release button will enable the students to each have a turn being the designated photo taker while the other students will have an opportunity to drop one color at a time into the clear water bin. Recording this process with videocameras to capture dialogue as the students create the work will be important for reflection later on. Another option is to set up a self-timer so when the student presses the shutter-release button, numerous exposures will be taken at a time capturing the process to use as a starting point when facilitating discussion with the children at a later time without the actual materials used.

LESSON SEQUENCE

<i>Teacher Actions</i>	<i>Expected Learner Actions</i>
<ol style="list-style-type: none"> 1. Set-up materials for students in advance 2. Introduce project to students: <ul style="list-style-type: none"> - How the camera works, using the shutter release button, changing the shutter speed 3. Work next to students to facilitate dialogue: <ul style="list-style-type: none"> - What is happening? How can we change what is occurring? 4. Change the water when needed, allows students to help in this process. If using a light table, ask students why the color going down the drain is that color vs when it is on the light table. This provided for deep conversation leading to light, where water travels, etc. 5. Repeat lesson with students, asking how the results can vary from previous attempt - look through images taken. 6. Repeat lesson entirely with more students if there is time. 7. Take image and review with students. 8. Optional: compile students images to create a stop-motion video as another visual representation of time 	<ol style="list-style-type: none"> 1. Place smock on, roll up sleeves 2. Students will engage in learning how the camera works and take turns using the camera/changing settings 3. Students will experiment with taking photographs, dropping liquid colors into the water, dictating where the color goes, using eyedroppers to alter the image 4. Students can repeat lesson with allotted time. 5. Students can review images with teacher and watch video at a later time to see what happened over time.

ENDING THE LESSON

By the students taking numerous exposures, a stop-motion video can then be compiled to review and show the students how over time the water quickly quickly swirled to-

gether. Discussing what happened during the lesson by revisiting the images, the students can discuss their thoughts of what happened.

Documentation and Assessment

This lesson was completed numerous times, with the children ultimately getting slightly different results each time. The children also learned how to manipulate the image based off of past experiences. Below are some examples of the photos that were captured showing the children's results. Varying from one another, each image was taken with different factors. Some are on a table with watercolor dripped in, others are on a light table, with soap, and some were mixed by the students throughout the process. Each image is very different which represent how each time this lesson is completed, there will be varying results.

