

Art for All Design Collaboration

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Full Paper: Art for All Design Collaboration

Introduction

The formal Art for All (AfA) project at the University of Tennessee at Chattanooga (UTC) was initiated in the fall of 2016 with the goal to team first year engineering students with second year art students to develop assistive devices that help persons with disabilities express themselves in art. Specifically, the AfA project requires that engineering and art students collaborate to understand the boundaries of a client when creating an art product and to brainstorm and select the best solution.

This project involves two courses and their respective instructors - the freshman *Introduction to Engineering Design* course in the College of Engineering and Computer Science (CECS) and the sophomore *Figure Drawing* course in the Art Department of the College of Arts and Sciences (CAS). At first glance these courses have little in common. The art course requires art students to be knowledgeable of the practice of making art and the engineering course requires engineering students to be knowledgeable of basic mathematical and science applications. However, both courses require students to work through a design process to produce end products. Art students are trained to work with studio prompts that provide a framework but that encourage students to interpret, experiment, communicate, and arrive at multiple solutions. They are trained to be comfortable with ambiguity because students need to understand the idea that multiple readings of a work are possible. The role of “the viewer,” one who experiences their art through the lens of their experience and interpretation, is emphasized. Engineering students are trained to understand client needs, and to specifically define functions, objectives, and constraints. They are encouraged to prototype and test ideas (experiment) and arrive at multiple solutions from which they determine one that best meets client and project needs. They are trained to communicate these ideas verbally and in writing. The role of the customer is emphasized. Art and engineering students use similar creative processes to help determine their end products – sketching, discussion, expert opinions, and prototyping. Art and engineering students also have varying degrees of interest in the relationship between form and function.

To create the collaboration, the course instructors assembled discipline-based (engineering or art) student teams which were then combined as multi-discipline teams at various times during the design process life. Initially the discipline-based teams worked separately to build their understanding of the client’s problem. The teams were then combined for future meetings. During the first combined meeting the students shared different viewpoints of the problem and client’s needs. Ultimately the art students served as experts of the art process by applying their knowledge of art materials, existing tools and equipment, and the art-making process. The engineering students ultimately served as the designers and builders, including the client and art students as needed for idea generation and device testing.

This paper reports on the progress of this project over the last 2 years. During this time the project moved from initiating the activities to completing and delivering 11 art tools to various clients in the community. The student created art tools, the associated client created art products,

and examples of the student team design process products were showcased in spring *Art for All* art exhibitions in 2017 and 2018. In addition, two student teams presented their work at the 2017 ASEE Zone II Conference and one team, composed of engineering students and an art student, presented a design solution at the spring 2018 ASEE SE Conference.

Project Substantiation and Importance

In the 1980's, research introduced that disability is socially created rather than rooted in the individual [1]. More recent studies indicate that persons with disabilities may move through a process of seven types of identities: isolated affirmation, apathy, resignation, situational identification, affirmation, crusadership, and normalization [2]. Studies also indicate that the arts, including the visual arts, can be a tool to aid transition through these identities to enhance self-esteem and confidence. Specifically, participation in arts programs can help persons with disabilities identify and address perceptions of disability and thus engage in self-realization. [3] [4]. This is possible because they experience that art is an extension of the physical body.

This project is important because it creates tools that persons with disabilities may use to help them express themselves in visual art and thus become crusaders and achievers of goals of the larger society. It is also important because it teams engineering students with art students to work through the design process to create the tools. This teaming benefits the students by introducing the engineering students to artistic understanding that results in better addressing the needs of the client and by communicating to the art students that they play an important role in the engineering design process. In addition, it illustrates to the students that being an engineer or artist is not solely about building a better device or presenting ideas visually – it is about effecting change and improving our society.

Project Description

The AfA project provides tools that enhance the experience of persons with disabilities at Signal Centers, local schools, and Open Arms Care. The project and its outcomes help UTC engineering students connect with two different parts of the Chattanooga community – (1) the persons with disabilities community and (2) the art community. Specifically, AfA has resulted in

- Enhanced art room at Open Arms Care with at least 2 art assistive tools.
- 7 design teams consisting of engineering students and art students with customers at Signal Centers, local schools, or Open Arms Care.
- 30 art students being introduced to the engineering design process
- 50 engineering students being introduced to the art design process
- 2 student teams participating in the student poster and design competition at the 2017 ASEE Zone II conference (2nd place in the freshman-sophomore design division).
- 1 student team participating in the student poster and design competition at the 2018 ASEE SE conference (1st place in the freshman-sophomore design division).

The AfA project specifically addresses two goals of the CECS Strategic Plan:

- Goal 1: Transform lives through meaningful learning experiences
- Goal 2: Inspire, nurture and empower scholarship, creativity, discovery, innovation and entrepreneurial initiatives.

The Project Collaboration

One challenge faced in the first year of the project collaboration was that the art and engineering classes met on different days. This meant that aside from one scheduled meeting outside of class times, the students were strongly requested to meet several times over the length of the project outside of class times. This did not work as hoped. While some teams did meet, others encountered difficulty finding times to meet as a full team or reported a breakdown in communication. There was a general sense of frustration amongst the art students who felt they were not invited to be more involved beyond the initial meeting. It became clear that to strengthen the experience for students going forward, the classes would meet at the same time, with multiple meetings built into both course schedules. Thus, during the 2nd year of the project, the course instructors scheduled course sections to meet at times that overlap. This allowed art and engineering students to meet during scheduled class sessions over the course of the semester, which greatly improved their ability to meet as collaborating teams.

The instructors initiated the project by visiting each other's course to introduce the art students to the engineering design process and the engineering students to the process of art making and the role of the body. Both presentations were welcomed by the students. The engineering students participated in the discussion of the art creation processes and appeared honestly interested in the various means artists use to express their product. They were especially interested in the section of the presentation that illustrated how artists may use their body to create art. The art students also participated in the discussion of the engineering design process. They were responsive in helping define an issue using objectives and functions, and in understanding the difference between objectives and functions. They were especially able to differentiate between form and function. One student, in a reflection, expressed how she saw the connection between engineering and graphic arts with respect to the design process:

Dr. Wigal spoke to our class about how her engineering students use the design process to find the problem they are solving. I found this helpful, not only for the project, but for the design projects I might have in the future. The process for engineering is not unlike methods I have been taught in graphic design classes. [6]

Prior to the discipline teams' first meetings, however, both the art and engineering students chose the project they desired to support and began understanding the problem and client needs from their discipline perspective. Upon meeting for the first time, the students shared their understanding of the problem and client needs and began brainstorming solutions. At the second meeting, the students shared sketches and prototypes of solution possibilities. The engineering students and some of the art students also met with the clients during this part of the process.

It was the engineering students' role to consider all possible solutions and determine the best solution based on a structured decision process. The engineering teams shared their decisions with the client for confirmation and they began the build/test process. The art students participated during this process to ensure that the solution addresses the art making process appropriately. The students could be found working together in the classroom or in the freshman engineering design shop during this phase of the process (see Figures 1 and 2).

Upon final test and build, the project solution was presented to the class and then delivered to the client. The art students were invited to participate in these events, though none did, due to scheduling conflicts, since these events occurred at the end of the semester near or during finals.

Project Reaction

The challenges encountered through this collaboration are not discipline specific and are likely challenges students will find in professional life. There were many opportunities to talk through strategies, work through challenges, improve communication, and discuss expectations to help the students, both art and engineering, have productive team meetings. In a written reflection, student Ashley Smith (Team Mouthstick, F'16) remarked *“Even from the beginning, there were times where there seemed to be a language barrier between our classes. Both have their own understood terms and ways of thinking, so it was nice to work through those moments and see a fresh insight on the problem.”* [5]



Figure 1: Project Team in Classroom



Figure 2: Project Team in Shop

While this is the main project for the engineering students, it is only one component of the course for art students. Most art students had a positive experience and felt valued by the engineers, but some felt they were given superficial responsibilities. With one team, for example, art students were asked to “decorate” the design, which made them feel undervalued. During a group debriefing with art students in fall 2017, they all agreed that, for their contributions to be most helpful, they need to know how to be actively involved. In both semesters of this project, the art students with the best experiences felt like they could ask the engineering students questions, were asked questions by the engineering students, and felt their ideas were heard and valued. Amanda Booker, an art student who participated on the fall 2017 Sixth Sense Art Table team reflected on the collaboration experience:

Our first meeting with the engineers was a bit disorganized, but that is to be expected when working with a group for the very first time. We seemed to be having multiple conversations, rather than a single one and it took a lot of time to assign tasks to be completed after the meeting was over. A noteworthy aspect is that each of the engineers seemed to genuinely value our contributions and listened intently, taking notes and building off our ideas.

Our second meeting with the engineers was very productive. They had many questions prepared about different art materials and art making processes and I feel were truly interested in what we had to offer. I left the meeting feeling that the engineers had a good idea of the final object. [7]

Meagan Grim of the Jada Art Tool team mentioned:

Despite my initial reservations and anxieties, our engineers were very amicable and receptive to our ideas about the project. I am also intrigued by how our group of engineers saw us more as fellow collaborators rather than just consultants after suggesting that we take on the design work for a few of the ideas while they work on others. [8]

One surprise for the art instructor was how engineers use rich pictures (see Figure 3) as a component of their design process, which is a perfect example of how drawing can not only be a tool for communication but a tool for thought.

For the art instructor and students, working through the approach to design thinking presented by the engineers, helped them think through potential solutions in a more structured and logical way. Alternatively, the engineering students were challenged to consider new possibilities because the art students are trained to push against constraints. The engineering students were also challenged by the art students' use of writing to communicate problem solving and clarify their thinking.

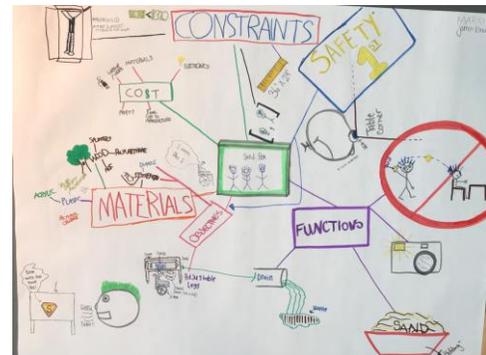


Figure 3: Rich Picture

Project Culmination

The project culminates with (1) a product delivered to the client, and (2) an *Art for All* exhibition that showcases the designed devices, art created from the designed devices, products developed to assist the design process, and art products expressing a reaction from the art students to the collaboration. The 2017 *Art for All* exhibition emphasized the products and the art created from the products. The 2018 exhibition emphasized the design process and art student reactions. Both exhibitions were successful and interestingly displayed the engineering-art collaboration.



Figure 4: Design Process Wall

One wall of the exhibition is dedicated to the illustrations of the design process (see Figure 4). This wall captures the collaboration and various types of visualizations both disciplines use to communicate design options – sketches, prototypes, tables, lists, and rich pictures. Included in the wall is also a summary of each of the products describing the client, client need and device design, as composed by the engineering design team. Another section of the exhibit, the middle floor space, showcases the devices created by the students (see Figure 5). The remaining walls showcase the art created by the students and the artists for whom the devices are made. For example, the top illustration of Figure 6 is a



Figure 5: AfA Product

painting created by an art student using her hair, one means of painting if one does not have hands to hold a brush. The bottom figure is a piece of art a child created using the mouth art tool, pad, and pencil holder shown in Figure 5.

Conclusions

The collaboration with the art department broadens the engineering student collaboration experience to include those outside of their discipline. This collaboration helps the engineering students learn to be open to others' contributions and means of communicating. Though the engineering and art students sometimes struggled to communicate, they learned from each other and produced a product that benefits the client. One team discovered they needed the art student's help to understand the true need of the client. An art student, now graduated, found that the experience helped open her eyes to ideas to help special needs students participate in the art classes she now teaches, which is sometimes difficult. [9]



Figure 6: Student Reaction

Though this course had the art students acting as consultants, in the future, the instructors of the two courses agree that for the project to be most successful, art and engineering students should work as true collaborators with equal stake in and responsibility to bringing projects to fruition. This may require a different course offering strategy such as offering a special projects course or an honors innovations course, team-taught between art and engineering.

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