# Work in Progress - Art, Design, and Community Service

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***Abstract* – Much of the research surrounding visual art and persons with disabilities emphasizes art as therapy. This project, however, focuses on breaking down the barriers experienced by those with physical and developmental disabilities. Specifically this project addresses the physical barriers that many with disabilities encounter when using art tools and resources of the able artist community. Freshman engineering students in an "Introduction to Engineering Design" course at the University of Tennessee at Chattanooga are, by using the engineering design process, designing and adapting or building art tools to aid persons with disabilities to express themselves in various visual art forms. During the process the students learn the needs of their customer, brainstorm solutions for the needs, select the best solution, prototype the solution, test the solution, and build the final solution and deliver it to the customer or partnering client. The design of the tool is also documented so it can be reproduced. Some of the needs addressed aid a group of individuals while others are specific to an individual's disability. The ultimate goal of the project is to develop a library of assistive art tools that can help persons with disabilities express themselves in a variety of art forms. This library will be located at partner locations but be mobile and thus available throughout the community. Presently the partner locations include Signal Centers of Chattanooga TN, HART Gallery of Chattanooga TN, and Open Arms Care Corporation of Ooltewah TN.**

*Index Terms* – Assistive art tools, Community engagement, Engineering and art, Engineering design process

## INTRODUCTION

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.

However, it is not always easy or straight forward for those with disabilities to create art as do those in the able-bodied population. This paper addresses an in progress project in a freshman Introduction to Engineering Design course that is helping to improve the ability of persons with disabilities to express themselves in art.

This project was initiated in the College of Engineering and Computer Science (CECS) at the University of Tennessee at Chattanooga (UTC) to address the needs of young people and adults with disabilities who have difficulty participating in art activities because their disabilities hinder them from using the typically provided art tools. A team including the professor for the freshman design course, a volunteer working with individuals with disabilities, leadership from two local area businesses that serve adults with disabilities, and the owner of an art gallery that displays and sells the art of veterans, the homeless, and persons with disabilities was formed to brainstorm how to improve the art experience for adults and young people with disabilities. The team determined that these individuals have a variety of needs and thus may need a variety of tools to help them create art. The solution is to develop a library of assistive tools that can help these individuals express themselves in a variety of art forms. This library will be mobile and thus available throughout the community.

The foundation of the project was initiated during the fall 2015 semester and continued during the spring 2016 semester for a total of three projects. A grant proposal was submitted (titled "Art for All") and granted to expand the number of tools created to eight a year. An instructor from the UTC Department of Art was added to the project team. It is hoped that libraries of assisted art tools can be made available at various locations in the region.

## PROJECT DESCRIPTION

In fall 2016, the *Art for All* (AfA) project teams of engineering students and art students will work through the engineering design process to create art tools. This teaming will benefit the engineering students by introducing them to artistic thinking that results in better addressing the needs of the client. It will also illustrate to the students that being an engineer or artist is not just about building a better device or presenting ideas visually – it is about effecting change and improving our society.

Both the engineering and art students will be introduced to the engineering design process, as illustrated in Figure 1. Using this process the students are responsible for client contact, functional definition, option definition, solution selection, detailed design and solution building and testing. The students will understand the needs of their population of interest and their various disabilities. They will design a tool that is durable and adaptable for various users. They will test the tool prototype with the population and then build and deliver the final product. To ensure sustainability, the students will document the tool design so it can be reproduced. The students reflect on the project and their experiences working on a team and for a person with disabilities at three points during the phase of the project – at the beginning, the midpoint, and the conclusion. The instructor guides the process only – the student teams are fully responsible for creating and producing the design solution while maintaining the $400 budget.

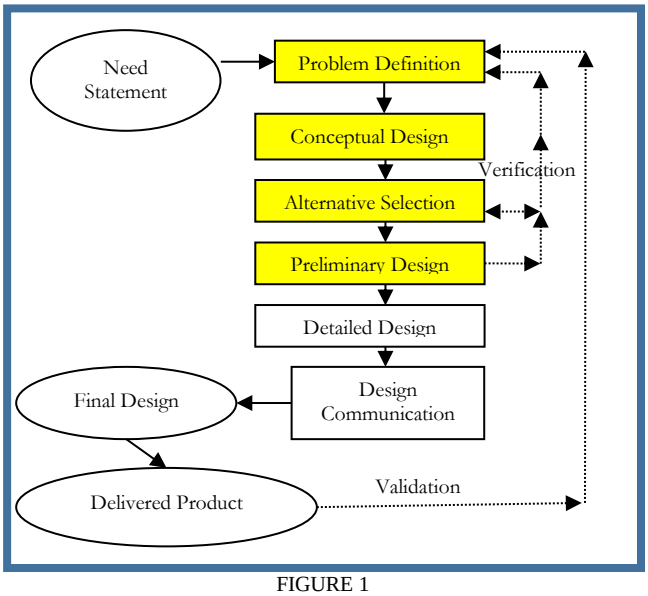


FIGURE 1
ENGINEERING DESIGN PROCESS

At the end of the semester the students will present their art tools to an audience of peers and community members prior to their delivery to the clients. To allow for tool reproduction, the students will document their tool definition, solution selection, and tool design in a formal design report. The report will include tool part drawings, operation instructions, and build instructions.

*Project Schedule*

A project pilot was completed in fall 2015 and spring 2016 when three assistive art tools – a paint egg toss tool, an easel, and a wheelchair chalk art device - were created for clients at Signal Centers of Chattanooga, TN.

The AfA project is being formally initiated during summer 2016 in project team discussions with Signal Centers and HART Gallery of Chattanooga, TN, and Open Arms Care Corporation of Ooltewah, TN, to define art tool needs as well as policies for the assistive art tool library. The project team is also formalizing the course structure for including the art students in the design process.

At least four student teams will work on designing and creating four tools during the fall 2016 semester and at least four additional teams will design and create an additional four tools during the spring 2017 semester. The tools will be delivered to the clients by May 2017. Also in the Spring 2017 semester art students will design and produce a Gallery Art Show to showcase the Fall 2016 art tools, produced art, artists, and designers.

## PILOT DEVICES

Three art tools were created during the 2015-2016 academic year. The design teams consisted of engineering students only and they addressed needs of adults participating in art programs at Signal Centers of Chattanooga. One of the tools – the paint egg toss tool - is illustrated in Figure 2.0 below.

FIGURE 2
PAINT EGG TOSS ART TOOL

The paint egg toss tool can be used by individuals in wheelchairs and those with various arm use and strength. The tool is placed on a table or a wheelchair tray near the canvas being painted. The distance from the canvas depends on the arm strength of the artist. The paint egg is placed in the holding cup, then the artist pulls the hook of the holding cup toward his/her body and releases it, sending the paint egg through the tube onto the canvas. The process is repeated until the artist is satisfied with the creation.

*Project Impacts*

The project and its outcomes help UTC students connect with two different parts of the Chattanooga community – (1) the disabled persons community and (2) the art community. This connection allows the disabled person and art communities to combine to provide opportunities for individuals to express themselves and share their talents. This project can also connect young persons in local school programs and others in community organizations to the benefits of art through the assistive art tool library program.

In addition to the development of the eight assistive art tools and the creation of the art tool library, the AfA project will result in

- an enhanced art room at Open Arms Care Corporation
- two to fifteen art students being introduced to the engineering design process
- 32 to 48 engineering students being introduced to the art design process
- paper and presentation of (1) the fall tools and progress of spring tools at the 2017 American Society for Engineering Education (ASEE) Zone II conference or (2) all eight tools at the 2017 National ASEE conference.
- participation of a student in the student poster and design competition at the 2017 ASEE Zone II conference.

The AfA project's goals and outcomes also address two goals of the UTC Strategic Plan:

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

*Evaluation Plan*

The AfA project's success will be assessed by successful delivery of, and client and user satisfaction with, the assistive art tool.

Successful delivery of the art tools to the clients will be determined by the tools (1) being tested with the client and user, (1) meeting required codes and standards, (2) being complete at the end of the respective semester, and (3) being presented to the customer. Evidence of testing and delivery will be indicated by video recordings and still pictures.

Client satisfaction will be measured using an electronic survey. The survey will use a three point scale (exceeds expectations, meets expectations, and does not meet expectations). The observational survey will be completed by the AfA project team and will involve the team members observing the tool in use at the clients' facilities.

*Art Tool Library Dissemination*

The project team will communicate the results of the project and the existence of the art tool library by (1) presenting a paper on the student experience at a minimum of one conference, (2) holding a poster session at UTC to showcase the projects to the University and Chattanooga communities, (3) showcasing the tools in an Gallery Art Show, and (4) publicizing the existence of the assistive tool library to area schools and other organizations assisting the disabled persons community. In addition, the results of the AfA project will be used to submit proposals to regional and national grant sponsors to build the assistive art tool library for not only the Chattanooga area, but also regions surrounding Chattanooga. This will include formalizing the documentation of the tool build instructions so they can be easily disseminated using the internet across the US and around the world.

## PATH FORWARD

As stated previously, the formal kickoff of the AfA project occurs during summer 2016. The time allotted for the design and build process will be extended from 7 weeks to at least 10 weeks. This is necessary to improve not only the fine details of the finished tool but also the details included in the design report, specifically the build instructions and expense report. The design project requirements will also be revised to include video and still picture recording of tool testing and delivery.

## ACKNOWLEDGMENT

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**Christina Vogel, MFA,** Assistant Professor, The University of Tennessee at Chattanooga, Department of Art, Christina-Vogel@utc.edu As a practicing visual artist and educator, Christina has a strong understanding of the artmaking process, with an expertise in painting and drawing. She has worked with K-12 student populations and teaches all levels of painting and drawing at UTC.