

Article Title: STEAMing up STEM: Visual Arts and Maker Culture as a Vehicle for Student Engagement and Collaboration on a STEM campus.

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STEAMING UP STEM: VISUAL ARTS AND MAKER CULTURE AS A VEHICLE FOR STUDENT ENGAGEMENT AND COLLABORATION ON A STEM CAMPUS

ALISON VALK

OVERVIEW

As programming within academic libraries evolves, librarians have moved beyond traditional information literacy instruction to an environment in which they create strong partnerships with the campus faculty, community and beyond. This paper addresses one such specialized partnership and unique library program, providing an overview of newly formed initiatives at the Georgia Tech Library. This instructional model may serve as a framework for other institutions considering non-traditional partnerships in library educational programming. The *Communication through Art* program involves a collaboration between campus faculty, the library, local artists and a community center focused on DIY culture and ephemeral media.

One of the many challenges on college campuses is finding new ways to engage students with their course material. Often limited by the constraints of traditional classroom spaces and layouts, college instructors are increasingly looking to collaborate with campus and community partners on unique student projects, but often lack the resources or time to adequately plan for such an endeavor. Libraries, with their evolving flexible spaces and commitment to changing pedagogies, are ideally positioned to facilitate interdisciplinary programs. Libraries by nature touch on every discipline, and often librarians can recognize relevant synergies and beneficial educational partnerships ahead of the curve. Bringing librarians, campus educators and community artists into the course planning process together can make the educational experience both more rewarding for the student and beneficial to the instructor of record. Our creative team developed a series of library workshops that incorporated the visual arts into the curriculum. What makes this library program unique is the primary educational focus on the campus. On a largely STEM (Science, Technology, Engineering and Math) focused campus, librarians and faculty utilized the visual arts as a vehicle for student engagement. This paper will discuss the benefits of this inquiry-based model of learning, as well as outline the practical aspects of how this program was planned, implemented and assessed.

BACKGROUND OF THE INSTITUTE

The Georgia Institute of Technology, commonly known as Georgia Tech, is a public institution located in Atlanta, Georgia. It has a total undergraduate enrollment of 14,682 and graduate enrollment of 8,427. Degrees in Engineering make up nearly 60% of all degrees conferred, with the next largest being the College of Business with 12.5%.

The Georgia Tech Library is an active participant in the teaching, research and service missions of the Institute. One of the core goals of library instruction is to support the institute curriculum and equip Georgia Tech students with the skills to enable them to think critically about the research process, use information ethically, and communicate effectively. The institute, largely STEM focused, but highly involved in interdisciplinary research and course work is an ideal environment for fostering programs that provide students with creative outlets inside and outside the classroom. Our pilot study in integrating visual art into course projects has proven to be both successful in engaging students, as well as popular with campus faculty.

PARTNERS AND COLLABORATION

With its first iteration occurring in 2013, this program grew out of the myriad of requests our instruction team receives each semester. The team handles approximately 400-500 instructional requests per year. As Multimedia Librarian, my role often involves leading course-integrated workshops on professional design software; thus there is significant overlap with visual arts related topics. We regularly offer this multimedia technical training across campus. However, after identifying an additional need for arts oriented workshops, our team set out to offer formalized programming that also included hands-on, arts based workshops in partnership with local artists and the Georgia Tech Paper Museum. We looked beyond the boundaries of campus and considered the valuable knowledge, skills and experiences local artists and community members could share with students. Building on the concept of multimodal communication and related course projects on campus, our team was able to acquire both internal and external funding to support *Communication through Art* and the institute curriculum. Most recently, the team was awarded an IMLS (Institute of Museum and Library Services) Sparks grant to support this initiative and ultimately share these instructional methods and findings on the program website. We are currently mid-way through the funding period and plan to have our findings and resources distributed in 2018.

Program Structure: Sample Projects and Assessment Methods

There are three main phases of the program: recruiting, implementation and assessment. The most challenging phase of the program is the recruiting phase. The purpose of this phase is to identify courses on campus that could benefit from the program. On a campus as large as Georgia Tech this can be quite an undertaking. The recruiting phase also serves as a way to identify additional campus partners. Teaching faculty on a STEM campus don't often initially consider integrating the arts into their courses. However, through targeted marketing, word of mouth, and by showcasing success stories on the program website, this initiative has gained substantial interest across campus. This online portal is crucial to the success of the program. The website acts as a marketing tool and as a resource for others who wish to design similar style projects and course content.

The website showcases previous project ideas, lesson plans, and teaching methods in order to assist faculty in designing their course projects. A shared and open approach to curricular development can support teaching and offer new perspectives on scholarship and pedagogies (Karaganis & McClure, 2016). The website also features a series of testimonials. Finally, this website acts as a portal for formalizing the course participation selection process by including a project proposal form. The form prompts faculty for various inputs: number of the classes they are willing to devote to the project, learning objectives, and how they visualize integrating arts into their course. Defining learning objectives and expectations ahead of time leads to greater success during the implementation phase.

Once potential partners are identified, planning and implementation begins. In addition to integrating these projects into the curriculum, planning includes identifying artist partners, discussing the time commitment, scheduling, and acquiring necessary resources and supplies. Listed below are some examples of courses that have successfully implemented artistic methods into their courses:

Study of Nineteenth-century Print Culture, Relief Printing: During a study of Nineteenth-century print culture and the labor movement, students were asked to recreate their own interpretations of protest posters associated with labor events of the time period. Students created both a digital version of their design with the use of advanced layout software and a handmade carved design for relief printing. The carvings and subsequent posters were accomplished through a series of relief printing workshops, reminiscent of the time period. This project hopefully provided students with a deeper understanding of the variety of intellectual and physical efforts that makes art, as well as technology, possible.

Study of Chaucer, Medieval Style Bookbinding: While studying Chaucer and his literary works, students were asked to create a physical book utilizing what they learned in class about medieval manuscript culture during Chaucer's day. They were also asked to later digitize that book, reflecting class topics regarding the contemporary "afterlife" of medieval works.

Study of Immunology, Relief Printing: In a senior level immunology course, students created relief print, public-service posters about the virtues of vaccination or hygiene in preventing disease. Students also created an accompanying video that explained their rationale for the design and the science or themes driving the artwork. The goal of the project was to have the students internalize how, despite all the data in the world, public opinion is shaped in many ways.

Study of Visual Culture, Digital Archives & H. Rider Haggard, Collage & Paper Circuits: Students learned about key concepts in visual culture and digital archives by studying the fictions and legacy of Nineteenth-century British author H. Rider Haggard. This project asked students to write a script and record a 4 to 7-minute audio guide to accompany one illustration from *Visual Haggard*. Students also created their own visual interpretations of selected text. These collaged illustrations were to reimagine, reinterpret, and remix Haggard's text in new ways. Students learned techniques for audio editing and paper collages.

The students used paper collage to create designs that, following the course's emphasis on digital technology, also incorporated paper circuits, switches, and LED lights. By making these illustrations haptically interactive and illuminated, the students enhanced audience experience with their projects.

Study of Information Design, Letterpress: This course presents the principles and practices that guide the development of emerging digital genres. There is an emphasis on maximizing the affordances of the computer in organizing and communicating complex information. This course is one of the first places students learn about the history of typography. Generally, students are only exposed to these kinds of topics digitally, but through this project the students learned from artists who were able to show them the physical roots of digital typesetting. Students collaborated with local artists and fellow students on setting type, letterpress and the printing process. Additionally, students participated in an interview with the participating artist about his craft and creative process, which was converted into a stand-alone podcast.

Toward the end of each semester, projects are designed to consistently include assessment, reflection, and a showcase of student work. The idea is that the projects come full circle. Final exhibits and critiques give students the opportunity to explain the rationale for their work through mechanisms such as artist statements, and give students an opportunity to take pride in their creations. The exhibits and showcasing of final work also serve to inspire other instructors in the ways they can incorporate such projects into their courses, thus functioning as a recruitment tool. Methods frequently used in art school programs have proven to be highly effective learning tools in a variety of classes on the Georgia Tech campus.

Both participating faculty and students are surveyed toward the end of the semester. Our team utilized Qualtrics for gathering relevant data. Participating faculty are asked to explain the ways the program has been effective or successful. Faculty are also asked to express concerns or challenges. Students are asked about what aspect of the program they found most valuable, how much the activities enhanced their comprehension of course content and whether they enjoyed the activities. Additionally, we utilize resources and assessment tools available to us through Georgia Tech's Center for Teaching and Learning. They regularly monitor and analyze the satisfaction and success of the students and teaching effectiveness. The CTL consultants are available to visit classes and to give targeted, evidence-based feedback and support. (<http://ctl.gatech.edu/resources/best-practices/GnR/observation>)

BENEFITS OF INQUIRY BASED LEARNING & EXPERIENTIAL LEARNING

Although it is not a primary role of arts in academia, visual arts has the ability to enhance learning in other subjects. A large facet of arts coursework is inquiry-based (Land, 2013). An inquiry-based model of learning is analogous with principles of critical thinking that are often important goals of college coursework (Heilig, Cole, & Aguilar, 2010; Goldblatt, 2006). Not only must education encourage problem solving skills, but education must foster curiosity and problem-seeking skills (Land, 2013). For example, a pilot project in which environmental engineering students and art students at the University of Georgia collaborated together in interdisciplinary design courses demonstrated there was great potential for artists and engineers to work together creatively in order to solve complex environmental issues. It was revealed that when visual arts projects were integrated into university engineering programs, those students were able to capitalize on the inquiry-based nature of their arts coursework and apply this to their engineering coursework (Cotantino, Kellam, Cramond, & Crowder, 2010).

Experiential learning theory emphasizes the overlap of experiencing, thinking, reflecting and acting (Ghanbari, 2015). The preliminary feedback our program has received confirms that learning is best conceived as a process, rather than in outcomes.

A student in our Spring 2017 class focused on Haggard described the learning experience:

The latter half of the class focused on creating visualizations, rather than just analyzing them. Much like the second project, the third project required us to create visualizations, this time in the form of an audio guide to an illustration to one of Haggard's works, and to recreate the illustration using a collage and paper circuits. To help us get started, our professor asked us to go the High Museum of Art, to interact with a professionally drafted audio guide. Sighing over going to the museum initially, I later came to realize that the museum visit was the biggest help I could get in my project. This boon helped me realize that my existing definition of an audio guide was completely inaccurate. Apart from just giving me access to the audio guide, the visit gave me ideas for my collage. I sufficiently synthesized all the ideas the museum gave me, the techniques I learnt during class, and the feedback peer-review gave me into the final version of my artifact. Not only did I learn about visualizations and the process of creating them, it gave my creativity level the boost it needed (Undergraduate Student, personal communication, April 25, 2017).

CONCLUSION AND NEXT STEPS

What began as a small endeavor has grown to include other partners including the Georgia Tech Paper Museum and several community artists. There is potential for further growth and funding through a strategic partnership with the Georgia Tech Office of the Arts.

Some initial lessons learned through our early programming is that expectations and time commitments for these projects need to be established and communicated early on. Additionally, some structure is needed for these assignments; deadlines for rough draft concepts, thumbnails or storyboards should be built into the course syllabus. Peer review and feedback should take place at each of these stages, as well.

Our initial findings indicate that having artists work with students in the capacity as solely a “consultant” or advisor is far less effective in engaging students than direct interaction through tactile hands-on sessions. Critiques and final exhibits, common place in art programs, are highly effective mechanisms for student engagement, regardless of the subject material.

The *Communication through Art* (<http://www.library.gatech.edu/arts/>) program seeks to enhance the student learning experience by forming a more direct educational collaboration between instructors, librarians, artists and the community. The program intends to facilitate interdisciplinary coursework in such a way that students gain a more holistic educational experience, while learning to become more effective communicators. We expect artists, librarians and educators will gain inspiration resulting in benefit to their own programs, institutions or organizations from the program website which will include shared lesson plans, training materials, and project ideas. If successful, this program would serve as a template for other institutions that wish to enhance the library’s role in instructional programs.

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APPENDIX



Communication through Art



Georgia Tech Spring 2017

Visual Culture, Digital Archives and H. Rider Haggard
Dr. Kate Holterhoff

This exhibit is a sample of student work created in Dr. Kate Holterhoff's English 1102 classes and Georgia Tech's Writing & Communication Program. In this section of English 1102, students learned about key concepts in visual culture and digital archives by studying the fictions and legacy of nineteenth-century British author H. Rider Haggard. This project asked students to write a script and record a 4 to 7-minute audio guide to accompany one illustration from *Visual Haggard*. Students also created their own visual interpretations of the text captioned beneath the illustration selected for their audio guide. These collaged illustrations were to reimagine, reinterpret, and remix Haggard's text in new ways. Students participated in a series of workshops held at the Library. Students learned techniques for audio editing from Librarian Alison Valk and artistic methods for paper & photo collage, including paper circuits, from local artist Ashley Schick. Many of the pieces on display incorporate an interactive element, including lights. Ashley Schick whose work has been exhibited nationally and internationally has been working closely with the Georgia Tech Library on their *Communication Through Art* program. In collaboration with local artists and campus partners, the program seeks to engage students through the incorporation of visual arts based projects into the curriculum. The exhibit displays were coordinated by Archivist, Kirk Henderson. The program was funded in part by a generous grant from the Institute of Museum and Library Services (IMLS).



library.gatech.edu/arts





STEAMing up STEM

Visual Arts as a vehicle for student engagement on a STEM campus

ALISON VALK GEORGIA INSTITUTE OF TECHNOLOGY MARCH 2015

Communication through Art

www.library.gatech.edu/arts/

This program involves a collaboration between the campus faculty & instructors, the library, and local artists. Along with artists from a local community arts center, the librarian coordinating the initiative and participating faculty members developed a series of library workshops that incorporated the visual arts into class projects and the curriculum. What makes this library program unique is the primary educational focus on the campus of Georgia Tech. On a largely STEM (Science, Technology, Engineering and Math) focused campus, librarians and faculty utilized the visual arts as a vehicle for student engagement, as well as forming lasting campus and community connections.

Study of Chaucer: Medieval Style bookbinding

While studying Chaucer and his literary works, the students were asked to create a physical book utilizing what they learned in class about medieval manuscript culture during Chaucer's day. They were also asked to later digitize that book, reflecting class topics regarding the contemporary "afterlife" of medieval works.

Partners: Dr. Robin Wharton, Artist: Elizabeth Castaldo (SCAD affiliated), Librarian: Alison Valk

Study of Nineteenth-Century Print Culture: Relief Printing

During a study of 19th century print culture and the Labor movement, students were asked to recreate their own interpretations of protest posters associated with labor events of the time period. This was accomplished through a series of relief printing workshops, reminiscent of the time period. It also hopefully provided students with a more complete picture of the variety of intellectual and physical labor that makes art as well as technology possible.

Partners: Dr. Joy Bracewell, Artist: Ashley Schick, Librarian: Alison Valk



Engaging Students through a physical process



Collaboration across Campus and with Community

Study of Immunology: Relief Printing

In a senior level Immunology course students will create public service posters about the virtues of vaccination or hygiene in preventing disease. The goal of the project would be to have the students internalize how, despite all the data in the world, public opinion is shaped in many ways.

Partners: Dr. Jennifer Leary, Artist: Ashley Schick, Librarian: Alison Valk

Museum Studies: Poster Design / Accordion books

During this Museum studies class, the students are curating and designing a historical exhibit. They are also creating publicity materials for the Interdisciplinary Nineteenth Century Studies Conference that will be held at Georgia Tech. The artist collaborating with them is guiding the students through the design process from start to finish in order to sharpen their visual communication skills. The students are also creating accordion books. The main idea would be for the students to find ways to present the most important themes in their work – and think more critically and creatively about those themes. Students sometimes have a hard time thinking through a thesis (as opposed to stating their subject), and doing an accordion book promises to be an excellent way to get students to reflect on their work.

Partners: Dr. Carla Gerona, Artist: Ashley Schick, Librarian: Alison Valk

FOR MORE INFORMATION

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