

Cultivating Community, Convening, and Collaboration through RIT's Makerspace

6th International Symposium on Academic Makerspaces

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ISAM
2022
Paper No.:
67

Introduction

Makerspaces are places of community, convening, and collaboration. They are spaces where *anyone* can “teach, learn, and practice creative skills”[1]. As such, this article charts our journey as students, staff, and faculty who collaborated within and beyond our academic makerspace to produce an exhibition in winter 2022 at the University Gallery at Rochester Institute of Technology (RIT) in Rochester, NY. This project was a five-week-long undertaking in an interdisciplinary museum studies course in collaboration with The Construct (our university makerspace), the Museum Studies program in the College of Liberal Arts, and the Vignelli Center for Design Studies. We reproduced items from the design archive and presented them to a wider audience as an embodiment of community, convening, and collaboration. We propose that this experience, which embraces makerspaces as sites of informal learning, in fact, mirrors the positioning of museums as sites of informal learning and the ethos of makerspaces themselves. Further, we suggest that museum studies courses, and other project-based courses, are well-suited for academic makerspace applications and offer suggestions for course and project development. Below we outline the nature of the course and this project, the role and purpose of the makerspace in our work, our workflow, and results before suggesting additional applications.

As co-authors on this paper, we represent perspectives as undergraduate students, staff managing our university's makerspace, and faculty in a liberal arts college within a technological university. While all faculty and staff of this project had familiarity with 3-D printing, 2 of 24 students had previously used a 3-D printer, meaning our project required the embrace of the makerspace ethos literally—to get the job done—and figuratively, as we used this mindset in our approach to all facets of the project.

Our onsite and online exhibition focused on 3-D printed objects, designed by industrial designers of international renown, comprising the OTHR collection at RIT's Vignelli Center. Utilizing resources of The Construct, we printed 10 “everyday” objects using .stl files from OTHR. Originally, the files were print-on-demand fabrications of 3-D printed ceramic, porcelain, and bronze: they bore witness to the

hallmark of limited-edition processes. We extended this concept into the familiar by using PLA-filament 3-D printing methods and materials to re-imagine and re-frame these designer-made objects as 3D-printed-exhibition objects. Through our 3-D replication, the high-design became familiar, reproducible, and exhibition-worthy.

The conjoining of exhibitions and 3-D printing is not new. Since its inception, 3-D printing has been an invaluable tool for museum education, accessibility, and research. Many replicas of fragile and priceless artifacts have been created to be used as tactile learning materials, as well as to make museum collections more accessible for the visually impaired. Some institutions have turned to 3-D printing to assist with research on delicate objects such as cuneiform tablets, creating durable replicas that allow multiple teams around the world to work together on these objects [2]. In our project, we created durable, high-quality replicas of fragile or previously inaccessible (either by cost or material) high design objects that could be used for display, tactile experience, and critical thinking about the role of design in everyday life. The partnership between RIT's museum studies program and 3-D printing was not new, either. In 2018-19, a museum studies student led a team, based at The Construct, to design and create 30 sets of appropriately-sized 3-D printed hands for use by a living history museum to showcase their Victorian clothing collection [3].

Building upon these contexts of makerspaces and our root discipline of museum studies, we first introduced the methods of 3-D printing in this spring 2022 course by holding our class *in the makerspace*. Having access to a variety of resources, including 3-D printing, enabled us to visualize the capacity of makerspaces as spaces for exhibit creation and our classroom ideation. The Construct is a discipline-agnostic makerspace that falls under the umbrella of Innovation and Entrepreneurship research at RIT, the space encourages an inclusive and diverse user base and seeks to foster interdisciplinarity. Such an environment invites participation from all of the University's nine colleges.

Implementation

Our implementation was framed around three operating principles: community, convening, and collaboration.

Community

The project was centered in a general education course (Visitor Engagement and Museum Technologies) offered by the undergraduate museum studies program at RIT. Because the course is situated both within a degree program while also being as an open-elective offerings for undergraduates, students have a range of personal learning objectives and reasons for which they take courses such as this, as it is open to all students, regardless of major [4, 5]. The variety of backgrounds that the students brought to the course, and to the project, mirrors the kinds of expertise and willingness to share knowledge among a community that is part of the makerspace DNA— expertise is admired and shared, rather than squirreled away.



Fig.1 Lilium Caraffe Set designed by Felicia Ferrone, 3-D printed by Team 1, photograph by Elizabeth Lamark



Fig.2 Birdhaus by Marten Claesson, Eero Koivisto, and Ola Rune, 3-D printed by Team 1, photograph by Elizabeth Lamark



Fig.3 Torq Nutcracker designed by Josh Owen, 3-D printed by Team 1, photograph by Elizabeth Lamark



Fig. 4 Exhibition Closing Reception, March 6, 2022, photograph by Elizabeth Lamark

Convening

A community of learners, our convening over five weeks centered a project that yielded an exhibition that utilized The Construct to create the objects that would make their way into the exhibit cases and become the objects of attention, interpreted by a second cohort of students, and presented to the public via web-accessible engagement activities designed by a third cohort of students. Each of the cohorts were led by a faculty member with expertise in that particular area of domain knowledge (exhibit construction and fabrication; exhibit content creation; and digital engagement) and all contributors were instructed on 3-D printing practices by the head of the makerspace, as the 3-D printed objects were the focal point of the exhibit—historically and in our own exhibit creation.

To begin, all students were charged with the task of doing primary research on OTHR [6]. Established in 2016 around the creative output of a handful of established and emerging designers who were called upon to envision useful, aesthetic, and unique objects that would be created through cutting-edge, digital manufacturing, OTHR aspired to transform design, manufacturing, and consumption. After OTHR ceased production in 2018, the entirety of the analog and digital collection—including .stl files for all of the items—was given to the Vignelli Center for Design Studies, a distinctive collection focused on modern and contemporary industrial design, housed at RIT [7]. Due to its import of framings around technology, art, and design which are key strategic initiatives of our university[8], this collection became the obvious choice for a project in a museum studies course, given our interest in and use of RIT’s distinctive collections [9] in classes and/or collaborative endeavors.

With the goal of making the context and history of each piece, the supporting drawings, photographs, and original prints from the collection, as well as our newly-printed PLA-filament renderings “discoverable,” each team devised a strategy and workflow to meet their objectives. The import of content, theory, and digital skills and methods were leveraged alongside incidental learning. No where on the syllabus does it state that a learning objective is to understand how 3-D printers work, and yet Team 1 achieved this objective, just as Team 2 learned how to create a YouTube playlist of songs

inspired by the works in our exhibitions and Team 3 learned how to adopt (and subsequently abandon) snow marketing tactics intended to boost onsite attendance at our exhibition.

Collaboration

The faculty and staff worked alongside students to examine the collections, print the selected items in The Construct, develop exhibition “big ideas”, write corresponding captions to support them, and employ methods to engage the public through creative digital experiences and an online companion exhibit.

Through this project, we navigated both the makerspace and the classroom; both the physical and digital worlds of the exhibit; and the dual modes of production both for ourselves in the course and for an outward-facing audience. In navigating both the actual and virtual worlds, our classroom extended beyond community, convening, and collaboration to attain competencies in assessing, researching, authoring, revising, and synthesizing material for the public, as outlined below. In each of the sections that follow, the team’s work is described in part and its contribution to the entirety of the project.

Team 1 (Production Team): Team 1 had the task of selecting one of the objects from the collection, experimenting with 3-D printing and creating a prototype of the object, and executing the prints that would be on view in the exhibit. In addition, the team produced all in-gallery posters and object labels that included drawings of the items by the designers. Red was chosen as the color for the PLA filament, both as an homage to the signature color that is part of the Vignelli Center’s brand and to distinguish these newly-created 3-D prints from those created by the original designers which came in a range of colors and materials. For the physical printing of the objects, the team used a “train the trainer model” where one student from the team worked closely with makerspace staff to gain a deeper understanding of the printing process and how to produce a high-quality representation [10]. All students were provided with a .stl file that they could edit or experiment with, as they wished. Students then worked with their team trainer to learn how to use the 3-D printer in the makerspace to produce their work. As they printed their items for the exhibition, they became more familiar and comfortable with 3-D printing as a technology and as the focus of our exhibition.

Team 2 (Context Team): The responsibilities of the second team were twofold, and most closely aligned with the idea of the “traditional” museum (while still pushing outside of those boundaries through collaborative and community-based methods). The students were instructed to create a set of labels for each featured object—one about the object itself, and one highlighting a connection to the broader RIT community. For example, the label for the bronze cake set featured a connection to a professor who had a family history in the culinary arts. The students utilized the diverse experiences and knowledge of their peers to find these connections, reached out individually to each community member, scheduled and conducted in-depth interviews, and communicated their findings to the other teams. Along with the labels, the students each created a short playlist based on each object, bringing in songs from inspirations as varied as

the background of the object’s creator, the intended use of the object, or simply the overall “vibes” and feelings of looking at or using the object. The work created by this team served as a bridge between the physical objects created by Team 1 and the digital content created by Team 3, while also reaching out to the attendees of the exhibition and inviting them to think critically about the connections they and their peers have to art.

Team 3 (Visitor Engagement Team): The third team had two engagement goals: to inspire curiosity about the works from the OTHR collection among students, faculty, and others, from the RIT community and beyond and to encourage visiting the exhibit in person. Parameters were placed on the team’s work: their deliverables must include a fully-functioning website that mirrors and enhances the onsite experience; a QR code; and an audio interview. Several false starts were made, including an attempt to make use of Rochester’s cold, wintery climate (adopting graffiti-like tactics of street artist Banksy and applying them to fallen snow). Other marketing efforts were suggested and abandoned, but what resonated most with the Team was Reddit-style quiz questions framed around the 3-D printed works. Team members developed quizzes that associated high-end designer works with luxury home goods and common, everyday items like scented candles [11]. These quizzes were distributed via social media and, in turn, picked up by other social media channels within and beyond RIT. In addition to building interest in the original works and our creation of these works through 3-D printing at RIT’s makerspace, Team 3 created the website for our exhibition which hosts links to all of the visitor engagement experiences as well as images of all of the works created in The Construct by Team 1 and all of the context-building narratives created by Team 2 [12].

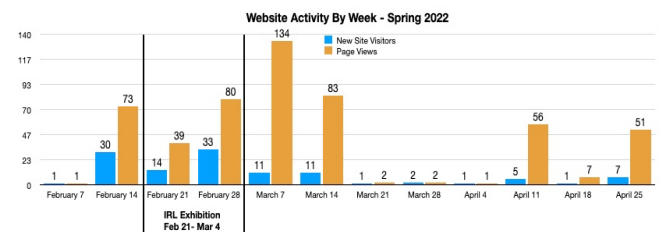


Fig. 5 Statistics for OTHR digital exhibition showing to dimensions. The orange bar reflects the unique views, ranging from a low of 39 to a high of 134 during the week of the exhibit closing reception. The blue shows unique visitors, ranging from a low of 11 to a high of 33.

This project utilized multimodal literacies and interdisciplinary practices that blended learning, doing, imagining, researching, creating, and partnering in the production of onsite and online content for the gallery’s broad visitorship. The onsite exhibit garnered about 200 visitors while the online experience gathered about 100 views per week in the leadup to and display time of the exhibition, along with smaller spikes in viewership later in the semester. Fig. 5 shows views ranging from a low of 39 to a high of 134 during the week of March 7 and unique visitors ranging from a low of 11 to a high of 33 during the week of February 28.

The teams also initiated their own methods of cultivating community, convening, and collaboration, whether virtually or in person. For instance, Team 3 created a “virtual makerspace” of Discord servers, Google drives, and Zoom rooms where they could meet and work—a safe place to collaborate, ideate, design, tinker, test, adapt, critique, and ultimately create the assets needed for our project. These meet-ups, hangouts, and online idea sessions were no different, really, than any other collaborative in-person workshop. The team essentially forged a *virtual* makerspace for collaboration.

Results and Further Applications

While at first glance, a museum studies course may not seem to be an obvious place for adopting the “train-the-trainer” approach or the embrace of makerspace practices. However, project-based courses in museum studies and other disciplines can serve as spaces for community, convening, and collaboration that yield real-world products—in this case a gallery exhibition—that achieve an affective learning goal: all participants saw themselves as co-creators of the exhibition *Not Like Any OTHR: Design for Another Time*. In addition to the incidental learning articulated above, students embraced the teamwork of which they were a part. They assessed, researched, authored, revised, and synthesized material for their own cohort fully aware of how it would contribute to both the realization of the onsite and online exhibition. This experience provided the makerspace another valuable example of working with non-STEM majors and how to incorporate maker education into curriculum.

Apart from our experience, we offer two takeaways for others contemplating a similar course design. First, consider the different types of knowledge that can be yielded if a course assignment or experience is centered around project-based learning and the makerspace. In our case, the OTHR exhibition engaged all of us in building our technological, pedagogical, and content knowledge [13] that centered experiential learning around the building of an onsite and online exhibition to highlight lesser-known archival collections. Collectively, we needed to immerse ourselves in the content knowledge of one particular collection of materials that we would need to create using the 3-D capabilities of our campus makerspace; develop a digital content strategy from website creation to visitor engagement; and prepare exhibition content to help guide visitors’ experiences onsite and online. The technological, pedagogical, and content knowledge are frameworks around which faculty and staff in other disciplines, beyond museum studies, might adapt our project concept and center their own project squarely in a makerspace.

In addition, consider your course’s audience [14]. Who’s enrolled? What are their majors? What do they bring to the community? How can a multitude of disciplines be engaged in a project centered around an academic makerspace? The positioning of this project within a liberal arts general education course signaled the possibilities of makerspaces across the curriculum, beyond STEM and art and design [3]. In our case, the very ethos of the FabLab (fabrication laboratory) signals experiential education that has

been the hallmark of museums, rooting back to John Dewey who recognized the educational value of museums (and making!) [4, 15]. Consider how general education courses might yield a receptive audience for this kind of interdisciplinary, “train the trainer” approach.

Conclusion

This classroom-based experience of three cohorts co-working and persistently and longitudinally engaging with one another among and between the teams allowed students, staff, and faculty to break free from the cul-de-sac—a learning framework that is unidirectional and leads only to an outcome of grades [16, 17]. This experience enabled us to embrace our roles as teachers, learners, and practitioners of skills, harkening back to the ethos of makerspaces as places to “teach, learn, and practice creative skills.”[1] In this way, we demonstrated how the application of makerspace-curricular partnerships could extend to include museum studies courses which routinely embrace the theories of informal learning and learning-by-doing. We showed how these framings, when applied to the students’ own experience within a course, yield the possibilities for both spaces and their communities. The museum studies classroom became an embodiment of the makerspace that we frequented in order to pull off our exhibition which utilized 3-D printing as both process and product. We contributed collectively and individually to a larger project—the activation of an archive of materials enlivened by 3-D printing, interpretation, and visitor engagement that enabled us simultaneously to realize goals of community, convening, and collaboration. We encourage others to consider how academic makerspaces can center learning beyond the cul-de-sac to frame community, convening, and collaboration.

References

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- [4] Z. J. Dowell and B. J. Lindsey, “Making Across the Curriculum: Multidisciplinary Making at Folsom Lake College,” ISAM 2018, Paper 11.
- [5] P. Blikstein, “Digital Fabrication and ‘Making’ in Education: The Democratization of Invention,” 203-221 in Julia Walter-Hermann, *FabLab: Of Machines, Makers, and Inventors*, New York: Columbia University Press, 2014.
- [6] <https://www.othr.com/>. Though manufactured by machine, each piece was produced upon purchase and was numbered, thereby designating their uniqueness as well as their minimal environmental impact. For access to the .stl files and the entirety of the OTHR collection, contact the Vignelli Center for Design Studies. Animations of the .stl files are viewable on our project website, <https://othrdigital.wordpress.com/> and on YouTube:

<https://www.youtube.com/channel/UC5yFSOQy2pxcQ8r4770dKzw/playlists>. An example is here: <https://othrdigital.wordpress.com/2022/02/11/lilium-caraffe-by-felicia-ferrone/>.

[7] <https://www.rit.edu/vignellcenter/>.

[8] <https://www.rit.edu/provost/initiatives/tad-intersection>.

[9] Cary Graphic Arts Collection, <https://www.rit.edu/carycollection/>; RIT Archives, <https://www.rit.edu/archives/>; and the Dyer Arts Center, <https://www.rit.edu/ntid/dyerarts-center>.

[10] While the “train-the-trainer” model is often used in business and healthcare, it has shown limited use in museum studies, with three citations to date on JSTOR regarding this training model, such as A. B. Whiteside, “Cataloguing Cultural Objects: New Descriptive Cataloguing Guidelines for the Cultural Heritage Community” *Art Documentation: Journal of the Art Libraries Society of North America* 24, no. 2 (2005): 16–18. <http://www.jstor.org/stable/27949370>.

[11] <https://othrdigital.wordpress.com/2022/03/01/take-a-quiz/>.

[12] <https://othrdigital.wordpress.com/>.

[13] C. Figg, J. Rowsell, S. Welbourn, K. Pelchat, “Using Informal Learning of Makerspaces to Enhance Technological Pedagogical and Content Knowledge,” In *Society for Information Technology & Teacher Education International Conference Proceedings*, 2018, 2037-2040.

[14] In the spring of 2022, the course comprised students from across the university, representing 5 different colleges. Of the 24 students, just over half (13) were based in the College of Liberal Arts with 6 students from the College of Art & Design; 2 from both the School of Individualized Study and the Golisano College of Computing and Information Sciences; and 1 from the College of Science.

[15] J. Dewey, *Experience and Education*, New York: Simon & Schuster, 1997 [1938], chapter 2.

[16] J. Decker, “Beyond Cul-de-Sac Pedagogy: Museum Studies as a Landscape of Practice,” *Transformations: The Journal of Inclusive Scholarship* 26:2(2016) 176-193, <https://muse.jhu.edu/article/663196/summary> which refers to Chuck Rybak’s assessment of cul-de-sacs “where students travel down sheltered roads, drop off assignments, and then make anxious return loops to collect their grades.”

[17] C. Rybak, “Cul-de-Sac Pedagogy.” February 21, 2013, *Sad Iron*, <http://www.sadiron.com/cul-de-sac-pedagogy/>.

Acknowledgements

The authors would like to thank Josh Owen and Joe Doucet; volunteers at the Vignelli Center for Design Studies, especially Valentina Scottini and Riley Mason who supported this project; and Elizabeth Lamark for documenting our project. Thank you to the MUSE 360 class in the spring 2022 who made this project a reality. Full acknowledgements are here:

<https://othrdigital.wordpress.com/2022/03/02/acknowledgements/>.