The Capturing Science Contest: an Open-Ended Approach to Promoting STEM Communication

Celebrating Creative Energy

EDITORIAL

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Since fall 2017, the University of Georgia (UGA) Science Library has hosted an annual Capturing Science Contest. The contest invites students to explain STEM (science, technology, engineering, and mathematics) concepts to a broader audience using any format, media, or genre of their choice. The idea for the competition spun out of discussions among the Science Library Research and Instruction team over how to encourage STEM communication beyond the traditional writing contest. We often see students teaching each other in the library, using computers and whiteboards to share elaborate schematics, concept maps, vocabulary lists, and STEM-related illustrations. We asked ourselves how we could celebrate and tap into this creative energy in order to further students' development as STEM communicators. We were also inspired by the innovative work we saw students creating in the Science Library Makerspace, such as UGA alum Tony Blasucci's Spatium Mechanicus, a strategic board game that teaches microelectronics (Blasucci 2020).

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After debating which types of competitions, such as photo contests or film festivals, might best solicit innovative STEM communication, we wondered if we should just drop all format requirements entirely. We agreed that an open-ended approach might inspire the widest range of student skills, knowledge, and creativity. While we would provide criteria to make our judging process transparent, we decided that our only requirement would be that submissions explain a STEM concept.

Now in its fourth year, the contest plays an important role in UGA Libraries' outreach efforts. Since 2017, we have received 161 submissions on a range of subjects and formats from both STEM and non-STEM majors. We received 71 in 2017, 36 in 2018, and 54 in 2019. According to Google Analytics, the contest home page has had over 6,000 page views over its life span. The popularity of the contest has helped us increase the combined award amount, which has grown from $1,500 to $3,000. Our success has also helped us secure additional financial support from the UGA Office of Research, which continues to cosponsor the contest every year. The contest provides a great opportunity for library staff to recognize and engage with students, and the judging process is a fun and challenging way for library staff to connect with each other.

This article provides an account of how we administer the Capturing Science Contest—from promoting the contest, to judging the entries, to announcing the winners. We also describe some upcoming changes to the contest that we are

implementing or considering. We hope that this account will help other libraries interested in experimenting with different contest formats, as well as those seeking ways to promote STEM communication and engagement.

Contest Promotion

The Capturing Science Contest launches each September when we put out a call for submissions; we set a submission deadline in late November and we announce the winners in late January. We promote the contest through a variety of channels: press releases, departmental contacts via our liaison librarians, instruction sessions, posters, flyers, newspaper ads, campus radio, and social media. Anecdotally, many students report seeing the contest ad in Stall Street Journal flyers, which appear in library restrooms across campus. We also reach out directly to student groups, campus units, and faculty whose teaching or research interests intersect with STEM communication and education. A key factor for promotion is the award money, which we divide into undergraduate and graduate prize categories.

In our emails to departments, we try to appeal to their local context and interests. For example, we have used the subject line "How could a choral fugue explain meiosis?" in a promotional email to the School of Music. This tactic also provides a concrete example of how one might interpret the open-ended contest rules, which may seem nebulous to some students. We focus our promotional efforts on individual faculty whose research or instructional emphases overlap with the contest (e.g., science, math, and engineering education; science journalism; and scientific illustration). These individuals can then serve as informal faculty advocates, sharing details about the contest with their students and colleagues. Some faculty have even offered extra credit to students who submit entries, which suggests the contest aligns with course curricula. In the contest's first year, a faculty member even required students to submit their final projects to the contest.

The Makerspace, housed in the Science Library, is a collaborative workspace that provides instruction on and access to technologies like 3D printers and virtual reality, which makes it an ideal platform for promoting the contest. Through their social media account and informal network of makers, the Makerspace has helped us recruit participants and, later, announce the winners. In fact, a number of students have used Makerspace tools to create their submissions. A recent winner, Madison Smith, used a MakerBot 3D printer at the Makerspace to prototype game pieces for her board game SYNERGY: A Game of Heat, Work, and Strategy.

Contest Judging

In our communications and on our website, we make explicit three criteria for judging submissions: clarity of expression, creativity, and appeal to a broad audience. We allow group submissions as well as work submitted for classes and other contests. As a condition for submission, we ask that physical entries be allowed to remain at the Science Library for six months for exhibition purposes.

A number of submitted formats have challenged our ability to store, display, and evaluate entries. We encourage students to communicate with us before the deadline to address any format issues or concerns. Some challenging formats have included a person-sized cardboard and foam hypodermic needle; a miniature green roof that required watering; clothing; a virtual-reality game that vexed our group's collective ability to play on any mobile device; and a mock bovine gastrointestinal system that used diapers, plastic tubes, and Pepto-Bismol to simulate digestion. In some cases, we encourage

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students to submit images or videos if a physical submission is not feasible. For instance, one student asked to submit digital images because his physical entry was, in his enigmatic words, "alive" and demanded "constant care and maintenance." (It turned out to be an aquarium.) When participants seek advice on how to present or format their entries, we try to avoid making specific recommendations, as navigating these kinds of format decisions are

Figure 1: Contest logos, 2017–2020

an important feature of the contest. Bringing together judges from different libraries and disciplines has helped us to better recognize the relative strengths of diverse entries. Our judges have been a mix of library staff from the Science Library and, at various times, the Makerspace, Art Library, Main Library, Miller Learning Center, Curriculum Materials Library, and Special Collections Library. For our most recent contest, we invited our graduate writing consultant, who is based at the Science Library, to be a judge. Recruiting non-STEM library staff to participate also reinforces our contest's multidisciplinary spirit. For instance, our art librarian's experience with art critique has allowed us to analyze and evaluate entries' aesthetic elements with greater appreciation and rigor. The contest has also provided judges a fun opportunity to connect with other library staff across UGA Libraries

We give judges about two weeks in early December to review submissions independently and at their own pace. During this stage, each judge completes an online form to score entries using a five-point scale for each of our three evaluation criteria. The form also allows judges to comment on each entry. We then tally these scores to create a short list of the top entries to review as a group. These tallied scores are not definitive; judges are encouraged to advocate for entries that merit consideration despite their lower cumulative score. For the next stage, we meet in person as a group for about four hours in mid-December to choose our winners.

The contest's open-ended approach presents a challenge for judges: How do we evaluate entries with such different formats? How can we compare a woven textile to an animated tutorial to an Instagram account? It helps to interpret the guideline "explain STEM concepts" broadly, allowing for a diverse range of communication methods. Our contest criteria also help us weigh the relative merits of each entry's rhetorical strategy.

A sample of winning entries gives a sense of these diverse approaches: Zachery Jarrell's A SA-Ve on Efficiency: Surface Area to Volume Ratio Explained and David DiGioia's Can Any Knot Be Untied? simplify complex topics with clever animated videos; Tong Li's Quantum Teleportation and Magic video and Megan Prescott's Designing Science Instagram account underscore the appeal of deceptively simple, well-executed ideas; Madison Smith's SYNERGY: A Game of Heat, Work, and Strategy and Ben Burgh's N3TW0RK show how games can facilitate learning; Katharine Napora's Tree Rings & Archaeology demonstrates how STEM educators can modulate their approaches to different audiences; and Katlin Shae's The Woven Quantum Image, Kathryn Koopman's gamma rhythm, and Alison Bank's Spheres of Heaven and Hell all convey the mutual resonance between science and art.

In some cases, we have offered participants suggestions on how to improve their entries, which for many represent passionate hobbies, career ambitions, or research interests. In fact, some students specifically request feedback from judges. We advised one participant on equipment available at the UGA Libraries that she could use to improve her podcast's audio quality. We encouraged other participants to conduct user research to test their games, recommending potential user groups and venues for recruiting them. We consider these types of suggestions to be an extension of our core work as librarians: suggesting helpful information and resources to students. At times, we have connected participants to the Office of Research Innovation

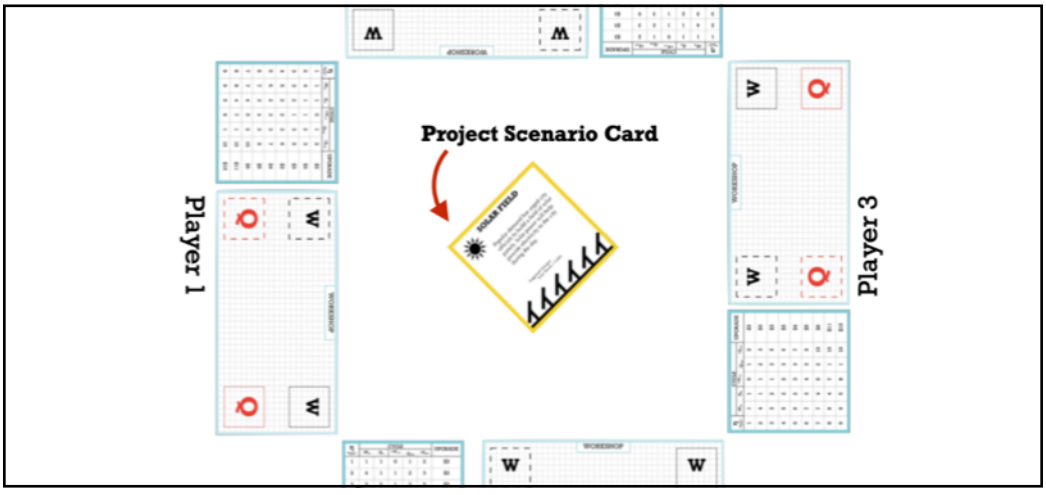

Figure 2: Game table setup for Madison Smith's winning 2019 entry SYNERGY: A Game of Heat, Work, and Strategy

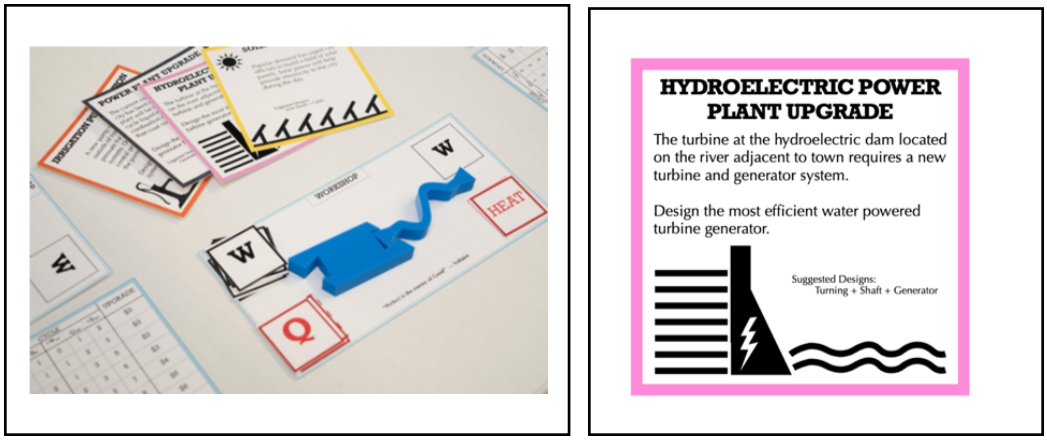

Figure 3: Game pieces and table setup for Madison Smith's winning 2019 entry SYNERGY: A Game of Heat, Work, and Strategy. Madison used a Makerbot 3D Printer in the UGA Science Library Makerspace to build and prototype some of her game pieces. (Bottom left photo by Amy Ware, University of Georgia.)

Figure 4: Material from Katharine Napora's winning 2019 entry Tree Rings and Archaeology. Katharine and her coauthor Kristine Schenk are also preparing a manuscript for publication on these outreach activities (Napora and Schenk 2020). (Photo by Amy Ware, University of Georgia.)

Gateway, which can support students looking to market their entries' intellectual property.

Announcing Contest Results

In late January we announce our winners through email, social media, and the UGA Libraries' website. In these communications, we link to our contest site (a LibGuide), where we provide judges' commentaries for each winner, briefly summarize their entry, and explain why it won. In addition to inviting site visitors to explore entries more in-depth, these commentaries also help us articulate the spirit of the contest. These commentaries help shape how we

as judges conceptualize the contest and signal to future participants how they might interpret our guidelines. Here is an example:

> In March to Andersonville Prison: STEM Edition, Daniela Murcia poses questions around "fun facts" in which science and history not only connect but intertwine in compelling ways. Her game, intended for fourth- to eighth-grade audiences, shows how the Civil War can be understood through STEM topics like medicine, engineering, mathematics, and agriculture. For example, some of Daniela's fun facts remind us that war is also a story about public health. Another theme in the game is how quantitative reasoning can be used to underscore important historical evidence around death, disease, and destruction. The game requires players to test, extend, and apply these fun facts in challenging ways, demonstrating Daniela's belief that students are more "capable of learning complex concepts" than we give them credit for. We can easily imagine students immersed in a future iteration of this game, blithely unsure whether they're in History or Science class.

In addition to the winning entries, we host all other submissions on Google Drive, which we link to on our contest site. In order to facilitate browsing, we organize all past and current entries by both subject and format.

We alert department contacts when their students have participated in—or won—the contest, or if any entry topics match their major subject areas. As a result, these departments will sometimes craft press releases to announce that their students have won contest awards (Flurry 2020; Kao 2019). These custom emails to departments take time to prepare, but they help to sustain interest in the contest.

Our cosponsor, the Office of Research, has been instrumental in communicating the contest to a wide audience. They have published social media posts, news and magazine articles, and press releases that either feature or mention the contest. For example, the Office of Research featured the tapestry Katlin Shae created for her winning 2017 entry in their quarterly UGA Research Magazine (Mann 2018). More recently, they supported the contest by conducting a photo shoot with participants for a news piece published by UGA Libraries' Marketing and Public Relations Department (Williams 2020). Our collaboration with the Office of Research has also helped boost the profile of our contest and winners with other campus units, such as the UGA Division of Marketing and Communications, who produced a video and published news pieces about 2018 winner Tong Li (Freeland 2020).

For each contest cycle we provide programming to sustain interest in the contest throughout the year. We have curated displays on tables and in glass cases in the Science Library to exhibit the work of winners and participants. One year, we created an interactive exhibit that allowed users to view winning entries on a touch-screen display. In our contest's first year, we hosted an event to honor the winners. During this small event, which was mostly attended by UGA Libraries staff, the winners gave brief presentations about their entries.

Upcoming Changes

While we have grown and adapted our promotional efforts over time, the original guidelines and judging process have not changed. However, our judges agreed to the following changes for the next contest cycle:

- Rather than simply stating that group work is permitted, actively encourage "collaboration and multidisciplinary teams."
- Replace explain with convey in the guideline "explain STEM concepts." The word convey conjures up a more inclusive range of communication methods, while we think explain comes across as more limiting and uninspired.

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- End the distinction between the undergraduate and graduate award categories, merging them into a single set of winners. When we initially created these categories, we anticipated that graduate students might have an advantage over undergraduates; however, the judges have not found this to be the case. We also found that some team projects included both undergraduate and graduate students, which posed a challenge to our award structure. The judges agreed that shifting to one category—with additional prize levels—could provide more flexibility in selecting winners.
- Provide additional funding for submissions that deal with certain themes, such as COVID-19 and Racial and Ethnic Justice in STEM. In this manner, we hope to encourage students to engage more directly with

Winning entry	Format(s)	Subject(s)	Participants' major(s)
2019 Undergraduates			
1st place: SYNERGY: A Game of Heat, Work, and Strategy	Game	Engineering	Engineering
2nd place: Flows into The River	Music and video	Ecology	Animal science
3rd place: Can Any Knot Be Untied? Intro to Knot Theory and Tricolorability	Video	Mathematics	Mathematics and computer science
Honorable mention: The Bachelorette	Video	Genetics	Biology and genetics
2019 Graduate Students			
1st place: Spheres of Heaven and Hell	Embroidery	Climate change	Geography
2nd place: Music of Life	Musical composition	Genetics	Bioinformatics and integrated life sciences
3rd place: Tree Rings and Archaeology	Learning activity	Archaeology and dendrochronology	Anthropology
2018 Undergraduates			
1st place: N3TW0RK: An Analog Game of Digital Communication	Game	Computer science	Computer systems engineering
2nd place: The Urban Heat Effect & Climate Change	Video	Atmospheric science and dimate change	Geography and history
3rd place (tie): Reabsorption: A Board Game for Life	Game	Biology	Biochemistry and molecular biology
3rd place (tie): All That Crawl: An Arthropod-cast	Podcast	Entomology	Journalism and ecology
Honorable mention: March to Andersonville Prison: STEM Edition	Game	History and general science	Cognitive science

2018 Graduate Students			
1st place: Quantum Teleportation and Magic	Video	Physics	Learning, design, and technology
2nd place: Where's My Creek?	Educational guide	Ecology	Forest resources
3rd place: gamma rhythm	Video art	Medicine	Music composition
2017 Undergraduates			
1st place: Earth Systems	Video	Environmental science	Entertainment and media studies
2nd place: Mitosis Melodrama	Short story	Biology	Pre-nursing
3rd place: To Earth, From Mr. Brontosaurus	Poetry and video	Climate change	Ecology and English
Honorable mention: Tree of Life	Music	Biology	Musical composition and musical business
2017 Graduate Students			
1st place: Designing Science	Fashion and social media	Microbiology	Microbiology
2nd place: The Woven Quantum Image	Weavings	Physics	Sculpture
3rd place: A SA-Ve on Efficiency: Surface Area to Volume Ratio Explained	Video	Biology	Poultry science

Table 1: Different formats, subjects, and participants' majors represented among our winning entries. Nine out of our twenty-two winning entries were submitted by students majoring in traditionally non-STEM fields, including sculpture, history, and music composition.

societal challenges and crises while still maintaining our contest's open-ended approach.
- Due to safety concerns and campus-access issues presented by COVID-19, we decided to accept only online submissions for the upcoming contest.

We are considering several other steps to improve how we administer the contest:
- Recruit testers to play and help evaluate board game entries, which may involve complex rules and conventions unfamiliar to judges. These testers could be members of gaming-related courses or student groups.
- Assess content promotion and engagement. We could survey participants to ask how they learned about our contest, which may help us identify successful promotion methods. While Google Analytics provides page views for our contest site, we do not currently measure user engagement with the 161 entries hosted on Google Drive.
- Advocate for hiring a student worker—perhaps as part of an experiential-learning internship—to support contest administration and promotion. As the contest evolves from an experimental "labor of love" into a regular piece of UGA Libraries' outreach, we should reflect on which features

are core to the contest and which are peripheral, and how to sustain and divide this workload.
- Explore working with the Office of STEM, which conducts its own Art of STEM competition (Office of STEM Education, n.d.). We have already discussed ways to build on the synergies between our mutual contests and goals through co-promotion. They could also help in assisting Capturing Science Contest participants who want to display, demonstrate, and conduct user testing on their entry ideas on campus.

Conclusion

Why might libraries host a competition like the Capturing Science Contest? While the contest does not require the use of library research materials, it does leverage our role as a multidisciplinary campus hub where students engage with a variety of subjects, tools, and activities. For UGA Libraries in particular, the contest has aligned with our strategic goal of being a "teaching library" where students not only consume but also synthesize, create, and share new knowledge (University of Georgia Libraries 2014, 11). Furthermore, it highlights the Science Library's potential to serve as a platform for STEM engagement and communication. On this last point, the contest aligns well with recent efforts by the Science Library and the Makerspace to host experiential- and peer-learning internships that involve the creation of STEM curriculum, exhibits, and workshops. We look forward to seeing how the contest continues to evolve and provide opportunities for both STEM and non-STEM students. In the words of one recent participant who learned new embroidery skills in order to create her winning entry: "This seems like my way to communicate—to create something. That was cool to discover about myself" (Williams 2020, para. 14).

Acknowledgments

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