» "No university in the world has ever risen to greatness without a correspondingly great library ... When this is no longer true, then will our civilization have come to an end." -LAWRENCE CLARK POWELL

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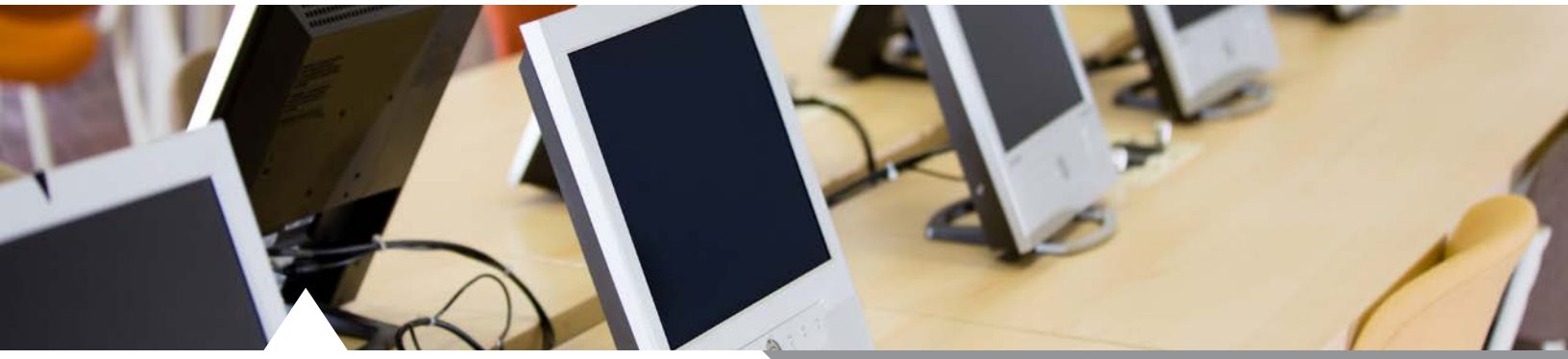


Issue 33 // October 15, 2016

Hack the Library

» Organizing a student programming competition at Adelphi University Libraries

BY STANISLAV "STAN" BOGDANOV AND RACHEL ISAAC-MENARD

In the increasingly digital world in which we live, libraries and the concept of libraries are constantly evolving. We continually experiment with technology and create library mobile apps and makerspaces in our quest to find the best ways to meet our patrons' current needs and find relevance in their lives. A new trend in the technology world now makes it easier to tap into fresh ideas, experiment more, and engage our audiences in innovative ways. This is exactly what we did at Adelphi University Libraries, where we organized our first ever student library hackathon.

WHAT IS A HACKATHON?

It seems that nowadays everyone is hacking. The verb *to hack* is no longer just a scary, negative thing one does to steal something. With the advent of hackathons, hacking implies creativity, innovation, remixing, and unorthodox problem solving.

While the dictionary description of the word hasn't changed just yet, it is already used in a variety of fields with a positive connotation, such as *growth hacking* in marketing or in the very term hackathon.

The term *hackathon* is quite loosely defined, and there is little to no peer-reviewed research on this recent phenomenon. The best basic definition can actually be found on Wikipedia. It is based on a 2012 *Wired* article about the proliferation of hackathons.[1] A hackathon is "an event, in which computer programmers and others involved in software development and hardware development, including graphic designers, interface designers, and project managers, collaborate intensively on software projects in competition with other teams."[2]

We stayed true to this definition at Adelphi. At our inaugural event, we had several groups of students who represented a variety of departments at Adelphi. They all came together to develop library mobile and web software applications over the course of a little under 24 hours. However, nowadays the term is used in a variety of other types of events that follow its basic

Hack the Library 2015 advertisement banner for digital and outdoor signage.

principles of intense project collaboration and competition. When deciding whether to organize such an event at your library, it is important to explore all the options.

Hackathons are no longer only about software. Hardware hackathons or makeathons are increasing in popularity. Intel has a running Internet of Things line of events, which take place every year and aim to make everything around us smart and connected.[3]

There are also *hackfests*, codefests, *techfests*, and more that seek to solve a specific problem via technology. There are also a variety of "open challenges," where people get together to solve all kinds of non-tech problems from creating new ways to process food to solving transportation issues in a Chinese city.[4]

At Adelphi University Libraries, we decided that organizing a hackathon would be a perfect opportunity to get new ideas for our mobile app, increase our outreach, and improve our image. Over the course of a year and a half, the library's emerging technologies coordinator and senior instructional media specialist worked together to design and organize our first hackathon.[5] We set up a library task force to assist with planning and sought buy-in from library faculty and administration, as well as university-wide support. We knew that organizing an event like this would require a lot of lead time and considerable joint effort. Not many people were familiar with the hackathon concept when we first started planning, so we had to spend a good amount of time crafting an elevator pitch to educate our colleagues.

Organizing a hackathon involves many components and requires effective project management. At the start of the project, we created a Gantt chart[6] to manage the various aspects of organizing a hackathon. This allowed us to see at a glance when we needed to start certain activities, whose responsibility it was, and what the due dates were. For event management, we used a platform called Hacker League. Students registered for the event there, we uploaded relevant documentation, and participants submitted their ideas to it at the event. A more popular site for such a service is DevPost, which we recommend you use. It also allows for students to build their hacking portfolios, for bragging rights, or even for future job portfolio submissions.

Volunteers and judges are crucial in events like these, and we established contact early with relevant departments, such as graphic design, computer science, and educational technology. This helped us sign on a lot of diverse volunteers and get word-of-mouth advertising to the students. As soon as we knew we had a growing interest in the community, we drafted a formal, two-page proposal for the event and started seeking funding.

We reached out to some external companies, whose products we planned on using during the event, to the library dean, and to the provost to see if they had money in their budgets. We were not able to secure outside sponsorship, but learned that to be successful in that endeavor, you really need to leverage your network. The majority of our budget came from the university, through the provost's office. Having this budget from the very beginning made planning much easier because it gave us a clearer picture on possibilities for prizes, food, etc.

Students realize hackathons are fantastic learning experiences, but often only while they are participating. Usually, it is the prizes that draw them in. We had two main prizes at our event—cool technology for first place winners (a Moto 360 smartwatch) and Amazon gift cards for second and third place. We thought students interested in hackathons would be interested in tech-related prizes and used the smartwatch throughout our marketing campaign. When you plan your own event, be careful not to plan prizes too far in advance if they are tech related. If we had ordered smartwatches one year in advance of the event, they would have been obsolete by the time we held it.

We wanted to reward our students for their time and motivate them, so we spent a big chunk of our budget on the prizes.

Free food is another big draw for students at our campus, so we made sure the other big chunk of the budget was spent on that. We ordered pizza at the start of the hackathon, and coffee and snacks were brought in later in the night. For the second day, we had boxed lunches (sandwiches) and coffee. Like many organizations, we were limited to work with our caterer, which used up a lot of our budget. If you are not required to do this, you can keep costs down by ordering pizza and snacks locally.

As soon as we had our budget and plans for prizes and food, we knew we had to book a room and a date for the hackathon. We had to reserve our room a year in advance, and even then we did not get the best date we could. We reserved the "ballroom," one of the largest spaces on campus for the event. Unfortunately, even with that lead-in time, we could only hold the event the Friday/Saturday before the start of the spring break, which was not ideal for student attendance. Initially, almost 100 students expressed interest via email and online form sign-ups. However, the actual event had 32 participants—one third of what we had aimed for. If you can, try to consider dates carefully. Do not schedule the event near exams, major research assignments due dates, holidays, etc. To get a better date, we considered alternate venues on campus, but none were suitable for an event of this type.

After booking our space, we knew that we had to discuss legal and IT considerations almost immediately. We had our university legal department create a waiver that students signed prior to participating in the event. This way, Adelphi would be

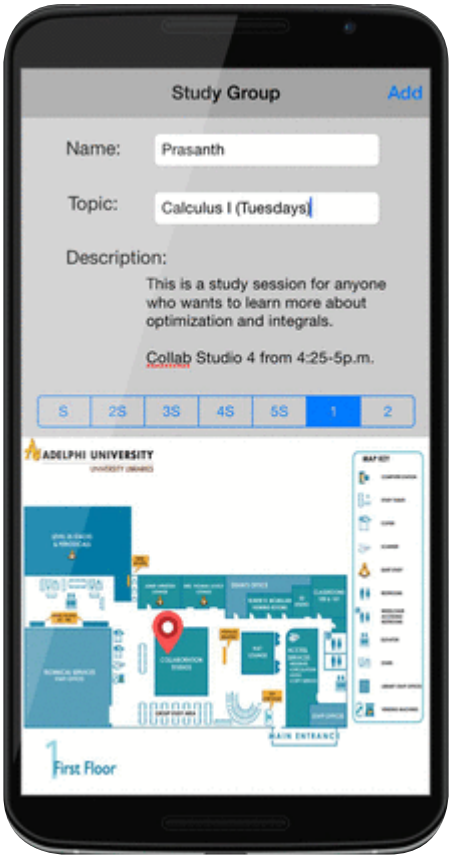
able to use ideas and apps created by the participants. We also liaised with IT and facilities departments to ensure wifi strength and energy supply were adequate for the hackathon. One difficulty we encountered, for example, was that all the power outlets in the room for our event were connected to only two transformers. Since plugging in a lot of laptops could overload the system, we had to disperse the tables throughout the ballroom. This slightly impeded the collaboration aspect of the event, since students were not as close to each other.

After figuring out your space and tech needs, marketing should be one of the first things you do. Pre-event marketing is critical to ensuring student participation (as well as interest on campus from administrators, faculty, and staff). We did this in various ways. In-house, we had a student intern from the graphic design department, but your library may have a marketing or outreach librarian. The student worked closely with our university's marketing department. We also reached out to the graphic design department and had them agree to assign a hackathon branding package assignment to students. We did not go this route in the end because it took a while, but we may do so in future. We advertised on our library website through a rotating banner, used digital signage in the library and around campus, print posters, leaflets, and tent signs.

Make the most of the event even after it has concluded with post-event marketing. This will create hype for hackathons in the coming years and raise the library's image. We created a rotating graphic on the website and had the winning team come to the library to present their app to library staff. However, we were not able to advertise the success of the event as much as we wished.

CONCLUSION

Hackathons are great events for both participants and organizers. They are fun and can be rewarding beyond the prizes. Hackathons can be more effective than the classroom at facilitating and initiating long-term learning. An event like this forces one to learn things it would have otherwise taken a month to learn. The time pressure, the extreme focus on a particular, practical goal, and the effect of being surrounded by like-minded and similarly motivated individuals, results in an extreme constructivist learning experience. Participants also make new friends and end up meeting people they would have never had the chance to meet otherwise.



Winning app demo screen.

At our hackathon, clubs like the Adelphi Games Club had the opportunity to promote their group and teach fellow students how to use game-making software. Some students used what they learned from them in the actual competition. Overall, hackathons are also a great way to contribute to a cause you are passionate about or to further developments in a particular field.

We were very lucky that students at Adelphi's Hack the Library 2015 produced many useful ideas that we can apply at the library. The winning team devised a study group scheduling tool. It allows students to meet like-minded classmates and get help with their studying—no matter where they are located in the library. A student can indicate a field of study and put a pointer on the map to show his or her physical location. We are going to make the winning app part of AU2GO—our university's mobile app. We also gained a better understanding of how students use the library and the issues they have. We received a great deal of positive feedback from both students and volunteers. The library emerged with a better image and an improved understanding from other departments on campus about what we do.

The hackathon has also inspired other similar events on campus. Our information technology department is organizing a makeathon, and the math and computer science club is working on their own mini-hackathon to inspire members. As the field grows, we'll see more and more institutions organize hackathons, and we hope this article inspires you to host a hackathon of your own. ■

ABOUT THE AUTHORS: Stan Bogdanov has been working with computers since age ten, when he accidentally hacked into his mother's accounting system. Currently, he serves as Director of Educational Technology at Boglio LLC, an edtech company he co-founded; and as Senior Instructional Media Specialist at Adelphi University. He can be reached at stan@stanrb.com.

Rachel Isaac-Menard is an Assistant Professor and Reference Librarian/Emerging Technologies Coordinator at Adelphi University and the Head of Research Support for Architecture_MPS, a scholarly journal and research group. She is also a Chartered Librarian who has participated in various publications and research projects in Canada, the US and the UK.

FOOTNOTES:

[1]Steven Leckart, "The Hackathon Is On: Pitching and Programming the Next Killer App," *Wired*, March 2012, www.wired.com/2012/02/ff_hackathons/all/1

[2]"Hackathon," *Wikipedia,* accessed January 17, 2015, https://en.wikipedia.org/wiki/Hackathon

[3]"Internet of Things Conferences and Events," *Intel,* accessed February 17, 2015, www.intel.com/content/www/us/en/internet-of-things/iot-events.html

[4]"New & Upcoming Hackthons · Devpost," *Devpost,* accessed November 17, 2015, http://devpost.com/hackathons

[5]Stanislav Bogdanov, Rachel Isaac-Menard, "Adelphi University—Hack the Library 2015," *Hacker League,* accessed November 17, 2015

[6]"What Is a Gantt Chart?" *What Is a Gantt Chart? Gantt Chart Information, History* and Software, accessed November 17, 2015, www.gantt.com/.

Teen Zine: Engaging Teen Patrons with Publishing

» Pasadena Public Library strengthens their teen services program while giving teens publishing experience

BY JANE GOV

(Publisher's note: In our August issue, we featured an article by Stephanie Katz of the Manatee County Public Library System detailing their efforts publishing a literary magazine with contributions from adult writers and artist from all over the world. This is a different take on library publishing as the writers and artists -- as well as the designers -- are teens in the local community, volunteering and learning as a team.)

Pasadena (CA) Public Library's *Teen Zine* is a bi-annual publication that features writing, photos, artwork, book reviews, and articles by or about teens at the library. The 30-40 page mini magazine is designed almost entirely by teens including layout, editing, graphics, writing (fiction and non-fiction), photography, and art. It gives teens an opportunity to showcase their abilities and earn volunteer hours while strengthening the library's teen services program and advocating for teens in the community.

Teens are often said to be the most difficult patrons to engage. There are a myriad of tips on how to engage teens, how to do target marketing, how to follow trends. The *Teen Zine* employs all of these tactics in the simplest of ways: awarding volunteer hours. Many libraries have teens who need to complete service hours or community service in the community. The *Teen Zine* was created in part because of the abundance of teens needing to volunteer and the library not having enough projects for them to do. The zine was also developed because our teen program needed a little revamping as the programs and services hadn't changed very much; it needed rebranding and a new image. Our teen blog was barely getting off the ground, and teens wouldn't see photographs unless they followed the library's Facebook page or went directly to the blog--which had a very low readership at the time. We needed a new way of drawing attention to our revitalized teen program and *Teen Zine* was the perfect way to showcase all of these efforts.

The *Teen Zine* employs one of the most old-fashioned ways of showing off: in print. To *Teen Zine* readers, the zine appears to be a sort of yearbook of the library's teen programs and services. That is certainly a fair description, but to the teens who are featured, who have contributed, or who are working on its assembly, it represents so much more than an outline of events. The *Teen Zine* as a final product takes on a passive role in engaging teens--just like other teen magazines, however, the entire creation of the zine is the true engagement piece.

THE PROJECT

Zines are most commonly known to be photocopied, self-published work in many forms (drawings, comics, writing), and is often created by a single author.

The Pasadena Public Library *Teen Zine* does not exactly resemble "traditional" zines, but the beauty of zines is that it can be anything--whether it's an accordion style fold, leaflets, a tiny book, or a simple card. The content and textiles of zines can be just as varied. The *Teen Zine,* however, is essentially a mini magazine. It is an 8 ½ x 5 ½ full color, glossy page booklet ranging from 30-40 pages. It is a bi-annual publication that features writing, photographs, artwork, book lists, interviews, and articles by or about teens at the Pasadena Public Library, a system of ten library branches.

The pilot issue was printed in fall 2014 and primarily assembled by the Teen Advisory Board, the library's teen leadership team. In order to expedite the project, we had help with the cover design, which featured an original illustration by a local art college student. Since then, a *Teen Zine* team has been assembled made up of other teen volunteers. This team is responsible for photos, graphics, writing, assembling, and editing the upcoming issues of the zine. While the teens ultimately are the decision makers, the staff drives the project forward by soliciting teen writers to report on library events, review new and popular books, managing the editing and proofreading process, and teaching and critiquing teen graphic designers.

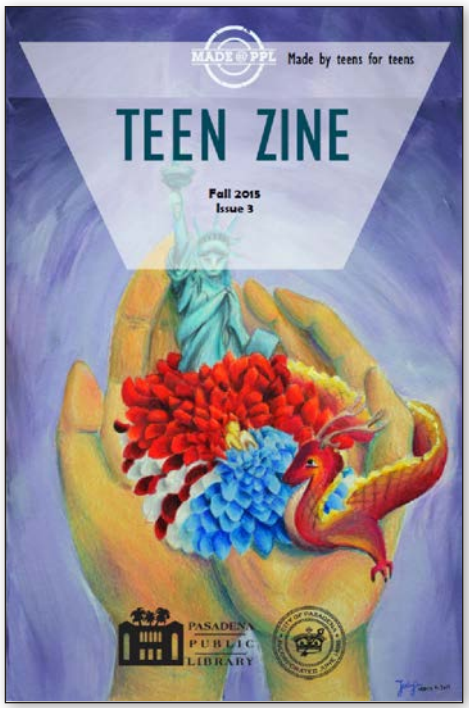
The *Teen Zine* is currently in its third year with its 5th issue forthcoming.

BENEFITS FOR TEEN VOLUNTEERS

Teens interested in writing, graphic design, collages, mixed media art, or journalism are most suited to assist with the *Teen Zine*. Additionally, teen volunteers should live near or attend library events so that they accurately represent the library's community. Working on the zine encourages teens to be inspired and have a responsible role at the library; it empowers expression in writing, photography, art, creation, and design. It taps into specific talents and passions of the teen volunteers while providing a learning opportunity in publishing and journalism. The content, quality, and teens' skills are sure to improve upon subsequent publications.

In addition to developing the above skills, the team is also challenged to work within guidelines and standards set by our organization, make compromises, or otherwise, persuade the staff editors with their opinions. Writers can get more comfortable with the editing process, and graphic designers can gain more experience with critique and revisions. Working on the zine also engages teens outside of the usual group who attend programs. A volunteer attending a program as a "reporter" gives them a respectable job at the event--and sometimes, this is more of an incentive than the event itself.

Since the zine also features book reviews, the teen book reviewers often have the added benefit of reviewing new or not-yet-released books (Advance Reader's Copy). For the rest of the teen writers, the *Teen Zine* adds another layer of presentation to their prose and poetry, and serves as a great piece for contributors to add to their college portfolios. Just as with anything else printed in a magazine, teens can more easily share their accomplishments with family and friends, and share their creativity with others.



BENEFITS FOR THE LIBRARY

More Publicity: Needless to say, the zine offers an additional platform for the library to share its work with the public. The *Teen Zine* acts as a great publicity piece for teen events, services, and the library.

More Program Attendance: With better publicity, library programs are more noticeable. Teens are encouraged to attend events, participate in contests, and contribute to the zine once it's evident other teens are enjoying themselves.

More Volunteers: The *Teen Zine* project increases meaningful volunteer opportunities and therefore, increases volunteer retention. Not only is the library able to retain volunteers for a longer period of time, but the same volunteers are more likely to be engaged with other volunteer projects beyond the *Teen Zine*. This project also gives the library a wider net of teen skills to utilize.

More Advocacy: Not only does the *Teen Zine* show the community what the library offers and how the library engages teens, it illustrates how teens are empowered, flourishing, and succeeding with libraries.

More Partnerships: Because of its inherent ability to preserve some of the best teen work, the *Teen Zine* has given the library a greater opportunity to partner with local schools, writing groups, and artists. Additionally, the Pasadena Public Library has cataloged the *Teen Zine* as a periodical and has added it to its archives; it's now a permanent piece of the library's and city's history.

TIME AND COST

Time: One of the most time consuming and most pertinent parts of the *Teen Zine* process is the mentorship between librarian and teen. Teen training requires an average of 2-4 hours per teen for graphic design. Critiquing writing and designs is an average of 15-30 minutes per page or article. Decision making about content and design, and final polishing and proofreading by staff is an average of 8-12 hours. It's estimated to take teen volunteers an average of an hour to write a 300 word article. Copy editing by a teen editor is approximately 15 minutes per article. The page layouts (graphic design) is estimated to take 1 ½ hours per page for a plain or semi-photographic page. Full photo layouts--such as pages with overlapping photographs and more complicated layers of text can take anywhere from 2-4 hours. However, depending on the skills of the teens, these processes can take up to four times longer for a beginner versus a veteran.

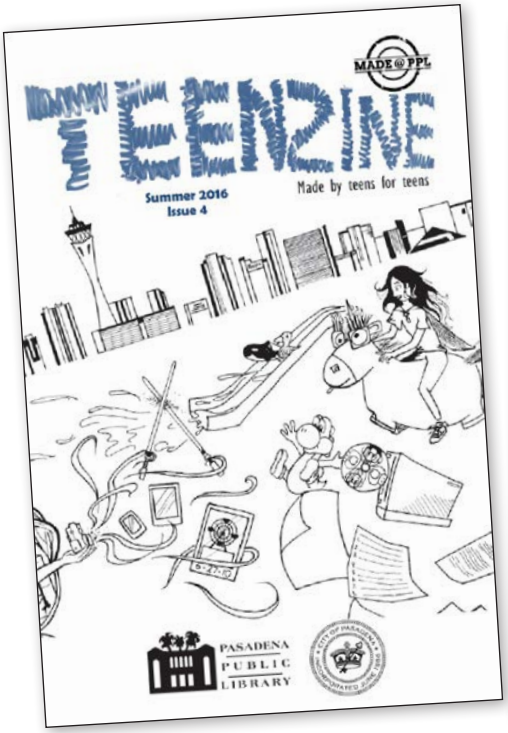
Cost: While the Pasadena Public Library opted to spend more on high quality printing, there are inexpensive options so that even libraries with minimum resources can offer their teens similar experiences. The Pasadena Public Library's *Teen Zine* cost about $2-2.50 per printed issue. To cut costs, you could opt to:

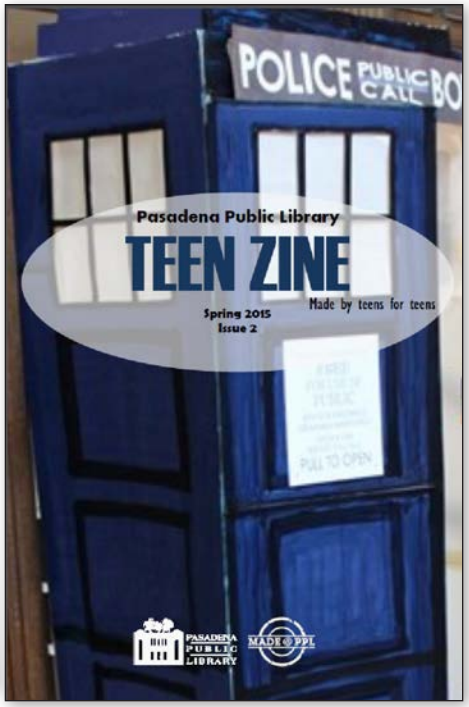
- Produce shorter issues
- Print a limited supply
- Print the zine in-house and employ teen volunteers to assemble photocopies by hand
- Publish a web version only
- Select a 1-2 color option (instead of full color)
- Go with a budget print shop (like Got-Print.com)

STEP BY STEP

Through this project, a number of guidelines were developed to streamline future issues and incorporate other teen library projects to make for an overall efficient process. Other projects to take into account were the teen volunteer program, the library's Teens Blog, and collaborations with the school district and local organizations.

1. Collect content: The content for the *Teen Zine* can be gathered from contests (writing, art, and photography),





event photos, articles by library staff or teen volunteers, and teen book reviews. Content can also be created specifically for the zine. Here are some examples of what you can use:

- Art contest winners
- Photographs of art created at a library program
- Photographs by teens (either contest winner or of the library, library teens, or at a library event)
- Scans of a comic drawn at a library program
- Writing contest winners
- Stories and poems written at a library writing workshop
- Book lists compiled by teen volunteers
- Book reviews by teen volunteers
- Interviews about notable people in the community conducted by the Teen Advisory Board
- Interviews of notable teens at the library such as a workshop leader, star volunteer, senior TAB member
- Library event recaps

2. Copy edit the content. This task can be completed by a trusted volunteer or a staff member. Copy editing can be done on Adobe using the annotation features, but perhaps the easiest method is to edit directly in Google Drive. Google Drive also saves a revision history, so staff can track all changes. If the library has a blog, this would be the point to post it on the blog or website
3. Designate layout designs and assign designers: There should be a good balance of layouts and color—but this is truly the decision of the zine designers. Teens can work with staff to decide on how best to approach the design. It's best to decide at the beginning (before starting on any layouts) which pages should be plain, semi-colorful, or full color layouts. This will also help to decide who should work on these layouts. Those with more graphic design skills would naturally be assigned to work on the semi-colorful or full color layouts. Those with less experience or just learning to use the software should start with the plain layouts, then progress to the semi-colorful ones. Here's an example of design ratios: 35% plain layouts (primarily text on single color background), 50% semi-colorful layouts, and 15% full photo layouts. To give teens an idea of the designs and styles, have them flip through a few popular magazines.
4. Page Layouts: Time for teen designers to get to work! Designate a style guide and show volunteers how to correctly set up pages before starting. Pages can be created digitally or hand drawn. Generally, most teens prefer to design pages digitally using MS Word or Publisher. Hand drawn pages can be scanned and added to the digital file. Be sure to give teens a few guidelines on types of backgrounds they can use and where to get free images.

Our style guide

- Page size: 8.5" x 5.5", with a "bleed" of 0.25"
- Page live area: 8" x 5"
- Content text: Arial Narrow 10 pt.
- Captions for photos: Arial 9 pt. italicized
- Book titles: italicized; use original flyer font if possible
- Crediting: All photos and artwork must be credited with artist's name.
- To credit teens, use full names for contest participants and volunteers.
- For all other minors (whenever possible) use first name and last initial,
- and age (unless otherwise instructed).
- Paragraphs: Single space, 1 line breaks for paragraph breaks, no indentation

5. Layout critique and revise: This task is primarily performed by staff. Unless a teen is close to a professional graphic designer, teen volunteers generally feel more comfortable receiving critique by a staff member. The critique can include placements of text and photos, color and shape choices, fonts and style guidelines. This is also a good time to teach additional design skills. Critiques should be sent directly to the designers or conducted face-to-face, and repeat this process until the page(s) is close to

publish ready. Staff may need to step in and make final touches.

6. Proofread each completed page: Like copy editing, this can be completed by a trusted volunteer or a staff member, but be sure there are different editors. If you're short on volunteers, rotate the copy editors and proofreaders. Assign proofreaders to pages they did not copy edit and vice versa. This is the time to final check spacing, grammar, styling, and credits.
7. Layout the whole zine: Organize pages in order of how they should be printed. Keep in mind the variety of color, content, fluidity, and what will appear in the centerfold. This step may set designers back to step three; however, if you plan well, you will not have to do this often. This is done by printing out all the pages in color and physically arranging them.
8. Fill spaces with "ads" and photos: This is an opportunity to fill in areas that are too plain and show off photos that are great, but do not seem to fit into any articles. This is also an opportunity to advertise a great upcoming program, but this should be done sparsely. Pages that are perfect for ads and additional photos are the credits page, behind the Table of Contents, endpapers, and the back cover.
9. Number pages and create a Table of Contents and a Credits page: Once everything is in place, number all the pages, making sure that the page number color is readable on all pages. Next, create the Table the Contents. Finally, create the *Teen Zine* Credits page, making sure to credit all the editors and designers, and add in an introduction to the issue--like a note from the editor or librarian's message.
10. Cover image: Choose an image for the cover. This is an opportunity to feature a contest winner or a notable teen project or event.
11. Final color: Add taglines, title, issue number, date, and logos.
12. Proofread the whole zine: Check page numbers and do a final review of name spellings and spacing. This step should ideally be completed by a staff member—preferably the librarian in charge of the project.
13. Final proof by administrator (if necessary): If you library requires a project like this to be reviewed by the Library Director or a Communications Director, this would be the time to do so. Final revisions can be made by staff.
14. Print the zine: The final proof is sent to the printers.
15. Share the zine: Once the zines are printed, announce it on social media, on the library's website, and share it electronically or deliver print issues to local schools, relevant organizations, and notify the *Teen Zine* contributors.
16. Plan for the next issue. Take a look at the teen events calendar, upcoming developments or projects, notable teens, and seasons. Write all of this down and make plans for the content in future issues. Schedule interviews with authors visiting your library, or teens teaching workshops to kids at your library. Solicit teen poets who will read at a library poetry reading. Ask teens who attend anime programs to write reviews. Ask for content early. It's a good idea to be proactive in gathering material for the next *Teen Zine*.

OUTCOMES

The Pasadena Public Library--specifically the Central library does not have a regular group of teens who go there after school. For a while, it was difficult to catch their attention, to find a way into their path. Teen writing contests once attracted a small handful of submissions, but now, four *Teen Zine* issues later, the submissions more than quadrupled. As mentioned above in the benefits for libraries, program attendance increased, and now, many local organizations are well aware of what the library offers for teens. If you decide to try out this project--even on a much smaller or simpler scale, be sure to track increases in program attendance and contest entries. Also, it's good to ask volunteers questions on what kind of skills they seek to develop, what they've learned in assembling an issue, and how they can improve and learn more in the future.

I'm a firm believer that any library with a strong teen volunteer base can create a strong teen program overall, and it looks like that theory proves to be true in this case. ■

ABOUT THE AUTHOR:
Jane Gov is a youth services librarian at Pasadena Public Library, CA. She purchases young adult materials for the library system and maintains the teen readers advisory lists, online resources, and webpages. She oversees teen programming including Summer Reading, Advisory Board, *Teen Zine*, book reviewers, and volunteers. Jane is a contributor to VOYA Magazine and an ex-officio member of the YALSA Board. She tweets as **@missjanegov**.

Enduring Access to Rich Media Content: Understanding Use and Usability Requirements

» Cornell University Library creates a framework for preserving access to new media objects.*

BY MADELEINE CASAD, OYA Y. RIEGER AND DESIREE ALEXANDER

Through an NEH-funded initiative, Cornell University Library is creating a technical, curatorial, and managerial framework for preserving access to complex born-digital new media objects. The Library's Rose Goldsen Archive of New Media Art provides the testbed for this project. This collection of complex interactive born-digital artworks are used by students, faculty, and artists from various disciplines. Interactive digital assets are far more complex to preserve and manage than single uniform digital media files. The preservation model developed will apply not merely to new media artworks, but to other rich digital media environments. This article describes the project's findings and discoveries, focusing on a user survey conducted with the aim of creating user profiles and use cases for born-digital assets like those in the testbed collection. The project's ultimate goal is to create a preservation and access practice grounded in thorough and practical understanding of the characteristics of digital objects and their access requirements, seen from the perspectives of collection curators and users alike. We discuss how the survey findings informed the development of an artist questionnaire to support creation of user-centric and cost-efficient preservation strategies. Although this project focuses on new media art, our methodologies and findings will inform other kinds of complex born-digital collections.

Despite its "new" label, new media art has a rich 40-year history, making obsolescence and loss of cultural history an imminent risk. As a range of new media are integrated in art works, these creative objects are becoming increasingly complex and vulnerable due to dependence on many technical and contextual factors.[1] The phrase "New media art" denotes a range of creative works that are influenced or enabled by technological affordances. The term also signifies a departure from traditional visual arts (e.g., paintings, drawings, sculpture, etc.). Another characteristic of new media art that adds further complications to the preservation process is its interactive nature. Works in this genre often entail, and indeed rely on, interactions between artists and viewers/observers.

In 2013, Cornell University Library received a research and development grant from the National Endowment for the Humanities to design a framework for preserving access to digital art objects. The Preservation and Access Frameworks for Digital Art Objects (PAFDAO) was undertaken in collaboration with Cornell University's Society for the Humanities and the Rose Goldsen Archive of New Media Art, a collection of media artworks housed in the Library's Division of Rare and Manuscript Collections. The project aims to develop scalable technical frameworks and associated tools to facilitate enduring access to complex, born-digital media objects, working primarily with a test bed of nearly 100 optical discs from the holdings of the Goldsen Archive. The preservation model developed will apply not merely to new media artworks, but to other rich digital media environments (for instance see Kirschenbaum, et al., 2010[2]). Many of the issues we have been addressing within the framework of this project apply to other rich digital contents, not limited to artistic productions.

From the beginning, the project team has recognized that both metadata frameworks and access strategies would need to address the needs of future as well

as current media art researchers. Toward that end, we developed a survey targeting researchers, artists, and curators to expand our understanding of users and use cases. This article summarizes key findings of the survey and describes their impact on our current preservation and access frameworks and future plans.[3]

ABOUT THE COLLECTION

The ultimate aim of the PAFDAO project is to create generalizable new media preservation and access practices that will be applicable for different media environments and institutional types. The nature of the project's test collection, a set of CD-ROM artworks from Cornell's Rose Goldsen Archive of New Media Art[4], has meant that the project provides a case study in new media preservation that may be informative to library and museum contexts alike.

Rose Kohn Goldsen (1917-1985) was a professor of Sociology at Cornell University and an early critic of commercial mass media's impact on social and ethical imagination. Named in her honor, the Rose Goldsen Archive of New Media Art was founded in 2002 by Professor Timothy Murray (Director, Society for the Humanities, Cornell University) in the Cornell Library Division of Rare and Manuscript Collections as an international research collection for scholars of new media and media art history.[5] Since its founding, the Goldsen Archive has grown to achieve global recognition as a prominent research collection that documents more than 60 years of the history of aesthetic experimentation with electronic communications media. These collections span the two most crucial decades in the emergence of digital media art, from 1991 to the present, tracing the historical shift in emphasis within media culture from disc-based to networked and Web-based applications. They also mark the early stirrings of a networked, interactive digital culture that has subsequently become the global norm. The Goldsen Archive constitutes a vital record of our cultural and aesthetic history as a digital society.

The PAFDAO project focused on a subset of born-digital media artworks on CD-ROM. These artworks were created for small-screen, single-user experience, and dated back as far as the early 1990s. The cultural significance of such artworks is great. Among other things, they represent the early development of interactive interfaces that are now a major part of our everyday life. And artists' exploration of the expressive possibilities these new multimedia interfaces have to offer. Despite their cultural value, and their relatively recent production, such artifacts present serious preservation challenges and obsolescence risks.

To begin with, no archival best practices yet exist for preserving such assets. Many are stored on fragile storage media like optical discs, meaning that physical damage as well as data degradation or "bit rot" pose serious dangers to the integrity of the information. In the case of the PAFDAO project's test collection, many of these discs were artist-produced and irreplaceable.

Interactive digital assets are, furthermore, far more complex to preserve and manage than single, uniform digital media files. A single interactive work can comprise an entire range of digital objects and dependencies, including media files in different types and formats, applications to coordinate the files, and operating systems to run the applications. If any part of this complex system fails, the entire asset can become unreadable. This danger is especially acute in the case of artworks. In most cases, interactive digital artworks are designed to create unique, multimedia experiences for users. An even relatively minor problem with an artwork's rendering—for example, an obsolete media player that no longer operates as expected—has the potential to significantly compromise an artwork's "meaning." Simply migrating information files to another storage medium is not enough to preserve their most important cultural content. When the PAFDAO project began, approximately 70 percent of the artworks in the test collection could not be accessed at all without using legacy hardware—a specialized computer terminal that runs obsolete software and operating systems.

The project's objective was to provide "best-feasible" access to artworks, and document the distance between "feasible" and "ideal," as well as we could understand it. Very soon after beginning PAFDAO, the project team realized that, contrary to our initial assumptions, operating system emulation would be a viable access strategy at scale for our complex digital media holdings (for information about emulation, see Lange, 2012[6]). Embracing emulation as an access strategy meant that the team could provide better access more easily to more artworks in the collection. Though increasingly feasible, however, emulation is not always an ideal access strategy: emulation platforms can introduce rendering problems of their own, and emulation usually means that users will experience technologically out-of-date artworks with up-to-date hardware. This made it all the more important for the team to survey media art researchers, curators, and artists, in order to gain a better sense of the relative importance of the artworks' most important characteristics for different kinds of media archives patrons.

ABOUT THE SURVEY

We developed a questionnaire that presented users of media archives with a number

of open-ended, largely qualitative and non-restrictive questions about their needs, goals, and preferences. In January 2014, we circulated the questionnaire on several preservation, art, and digital humanities mailing lists.

The PAFDAO team initially hoped that survey results would support the identification of "personas," or broad profiles of media archives users who shared similar needs and preferences. We hoped that these profiles would direct both metadata framework and access provisions. As it happened, no such clear classifications emerged, yet questionnaire results were still vastly informative, and shaped the development of the PAFDAO project in integral ways. In the remainder of this paper, we offer an overview of noteworthy trends and comments, then discuss the conclusions we draw from these results and their impact on the PAFDAO workplan and preservation framework.

SURVEY RESULTS

A total of 170 people responded to the questionnaire. Respondents came from disparate geographical locations, including the US, Germany, France, UK, Australia, and Argentina. Of 170 respondents, 122 responded as an individual researcher or practitioner and 48 responded on behalf of an archive, museum, or other cultural heritage institution.[7] We did not observe any significant differences in the responses of these two groups (personal and institutional responses), possibly due to the fact that even at an institutional level, new media projects and collections are led by small, specialized teams of committed individuals. Respondents often held multiple roles and characterized themselves non-exclusively as artists (48%), researchers (47%), educators (25%), curators (20%), collection specialists (24%). The scope of digital media art collections respondents worked with was also broad, and included digital installation, video and images, interactive multimedia, audio, 3-D visualization, and websites.

The key impetus behind the survey was to understand what kind of research questions and needs were motivating users to search for and use media works. This information is critical for the research team to identify and assess the nature and extent of viewing experience that needs to be preserved. In aggregate, respondents gave almost equal weight to artistic, social, historical, cultural, aesthetic, and technical research frameworks. Several described pedagogical uses and how they use media works in teaching and learning. Some sample research questions include:

- How are technologies assisting the exploration of political issues by artists?
- How do you bring the work to the viewer through the interactive power of technologies?
- Do digital works explore something further than the analog approaches can do?
- How do technologies support and stimulate community engagement?
- How are access issues for individuals with lower economic backgrounds being addressed?
- What are the possible implications of gender in digital media artworks?
- What does it mean to view an art work that is designed for an old TV set in a larger installation?

The respondents cited a number of serious impediments they had encountered in conducting research involving new media art. For example, they mentioned the lack or insufficiency of documentation and metadata, discovery and access provisions, and technical support. Ones who use new media collections in support of teaching and learning listed several impediments such as vanishing webpages, link rot, poor indexing, gap for works from the 80s and 90s, and the lack of quality documentation. Also often underscored were the complexity of legal issues and access rights. One respondent pointed out that, due to a widespread "disinterest in preserving the cultural artifacts of the digital age," there is a lack of understanding of the importance of these objects for cultural history. Another comment noted infrequent access requests and therefore difficulties in justifying institutional investment in preservation efforts for future use.

One of the respondents wrote, "In a society that is rushing headlong into the future, it is vital that we preserve the efforts of those who have early works in this new culture." Another one commented that as technologies evolve, some works become very easy to create and therefore some users don't understand the significance of a work and how it was a complicated piece to produce at the time. Such sentiments underscore the importance of documenting cultural context to situate the work from artistic, historic, and technical perspectives.

For practicing artists, there were several concerns about the longevity of their creative work. Some expressed concern about the difficulty of selling works that may become obsolete within a year. Many worried that it was difficult to store or archive immersive installations, interactive pieces, and work with dependency on external files. They also mentioned copyright issues as a significant challenge. Many emphasized the importance of historical contexts, usability, and discovery. One of them pointed out that archiving has become a part of his practice and he feels the pressure to consider future uses as he is going through a creative process.

For curators of new media art, many indicated that they don't include born-digital interactive media in their holdings because either such materials fall outside of collecting scope or the procedures for providing access are too complex or unsustainable. For those who collect this genre, the biggest concerns were trying to identify which aspects of interaction experiences to preserve and how to capture as much information as possible to assist future users. Out of the

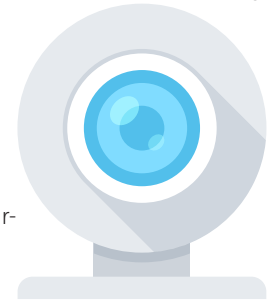
twenty survey respondents who answered on behalf of an educational or cultural institution, only one organization could claim a sophisticated and integrated web-based discovery, access, and preservation framework. The others indicated that access needed to be arranged through a special arrangement such as setting an appointment. They cited a range of preservation strategies they rely on, including migration, creation of search and discovery metadata, maintaining a media preservation lab, providing climate controlled storage, and collecting documentation from the artists.

CONTENT AUTHENTICITY AND AUTHENTIC USER EXPERIENCE

As mentioned above, the PAFDO survey of users of media archives did not, as we had hoped, result in the definition of clear user profiles or personas. However it had several important effects on the PAFDAO project. First, we noted a significant concern among our respondents for "authenticity"—understood as a cultural rather than technical concept.

The International Research on Permanent Authentic Records in Electronic Systems (InterPARES) project defines an authentic record as "a record that is what it purports to be and is free from tampering or corruption" (MacNeil, et al., 2001[8], referenced in Dietrich & Adelstein, 2015[9]). Verifying the bit-level self-identity of a digital object over time can be accomplished relatively easily with checksums, automated fixity checks, and collection audits. When working with cultural artifacts, however, "authenticity" becomes a more nebulous and controversial concept. Conservation measures undertaken to restore an artwork to some approximation of its original appearance may, in fact, alter its original form in ways that can affect its meaning. This is especially true in the case of artworks conceived to be ephemeral or experiential, or works that involve "contemporary" technologies that become obsolete, even obscure, over time.

Our questionnaire respondents seemed to respect this difficulty. Reading across the complete pool of responses, we noted that the desired sense of "authenticity" derived not from some naïve sense of the object's pristine originality, but rather from a sense that the archiving institution has made a good-faith commitment to ensuring that the artist's creative vision has been respected, and providing necessary context of interpretation for understanding that vision—and any unavoidable deviations from it.



We had excellent models for addressing these concerns. Within the last ten to fifteen years, many arts organizations have joined forces to develop shared practices for the conservation of technology-based media, but also difficult-to-document arts such as performance, video art and multimedia installations. Examples include Independent Media Arts Preservation (IMAP); The Variable Media Network; Matters in Media Art (a collaborative project between the Tate, the New Art Trust (NAT) and its partner museums—the Museum of Modern Art (MoMA), the San Francisco Museum of Modern Art (SFMOMA)); and INCCA (International Network for the Conservation of Contemporary Art).[10] The most significant commonality of these initiatives is their shared emphasis on appropriate documentation. While some complex time-based artworks can never be authentically replicated, it is generally agreed that, with proper documentation, many can be reinterpreted, adapted and revived for modern audiences. In cultural heritage organizations, this documentation can take the form of technical and descriptive metadata tailored for the breadth and specificity of new media, detailed installation instructions, detailed exhibition histories, and so forth. Above all, practices for working directly with artists have been especially important conservation tools, and the initiatives cited above provide excellent models for how artist interviews can aid efforts to preserve complex artworks; see, for example, the Variable Media Questionnaire.[11]

In response to these considerations raised by our user survey, we developed a conservation-oriented artist questionnaire and interview process, pushing the integration of archival protocols as far upstream as possible, to the point of content creation and initial curation. Enlisting the help of our project advisors, we worked with existing models, but adapted these models significantly. We streamlined and simplified our artist questionnaire to address specific aspects of our emerging preservation and access framework. We were particularly concerned about communicating with artists and enlisting their input about our decision to rely on operating system emulation as a default access strategy. Though easy and readily scalable, emulation introduces variations into the rendering of artworks that artists might not have anticipated; it was clear that we would need to work with artists wherever possible to ensure that artworks' most significant properties and interpretive contexts were preserved, and not obscured, by our access measures.

ARTIST QUESTIONNAIRE

The PAFDAO questionnaire is designed to be a first step in a two-part process, gathering essential information but also laying the groundwork for a more conversational interview process where possible.

First and foremost, the questionnaire elicits artists' input in identifying the most significant properties of individual media artworks by asking about the artists' initial vision for the work, and by posing open-ended questions about the relationship between artistic vision, technology, and historical contexts.

The questionnaire also asks fundamental technological questions. (e.g., "What software or programming language was used to create this artwork?" "What hard-

» **We were particularly concerned about communicating with artists and enlisting their input about our decision to rely on operating system emulation as a default access strategy.**

ware and software were optimal for running this artwork when it was new?") We inquire as to whether artists still have the working files they used in creating the artwork, including source code; these would constitute a deep technological and historical context for the works, and also an invaluable resource for future conservation work.[12] We also ask about related artworks or websites, and whether any of these materials may have been archived by another person or institution. Networks of collaboration between archiving institutions will become more and more important in preserving cultural, historical, and technological contexts of reference that will be essential to understanding these artworks.

The questionnaire also discloses foreseeable problems in our chosen access frameworks, including specific rendering issues that might come about with different emulation platforms:

- We have found virtual machine emulation to be an effective strategy for providing research access to interactive digital artworks. Running older artworks in an emulation environment may involve changes to the look and feel of the original artwork. Our default access strategy is likely to involve:
- Current, commercial-grade hardware and peripherals (mouse, screen, keyboard, etc.)
- Color shift associated with the change from CRT to LED monitor screens
- Possible alterations to the speed of animation and interactive responsiveness
- Possible changes to audio quality
- Presentation of digital surrogates rather than original physical materials that may have accompanied the artwork (discs, booklets, cases, etc.)

We ask artists to describe how such changes might affect their initial vision for the work. We also request permission to provide works in emulation, outline the kinds of documentation we expect to provide archive users, and invite artists to work with us on supplementary or alternate forms of documentation if they choose:

We expect to present users with a general statement about the effects of our emulation environments on the rendering of an artwork.

If you would like to author or co-author a more specific statement about how these changes may affect your work, we can provide researchers with this information as well. In some cases, we may be able to provide additional documentation of original rendering conditions. Please let us know if you would like to discuss these possibilities further.

Finally, the questionnaire furthermore provides us with an opportunity to revisit rights agreements, which must be updated in light of new access technologies, and an opportunity to invite further conversation (a follow-up interview) and collaboration with the artist.

CONCLUDING REMARKS

A reoccurring theme in our findings involved the difficulties associated with capturing sufficient information about a digital art object to enable an authentic user experience. This challenge cannot and should not be reduced to the goal of ensuring bit-level fixity checks or even providing technically accurate renderings of an artwork's contents as understood on the level of individual files. As Rinehart & Ippolito[13] argue, the key to digital media preservation is variability, not fixity. The trick is finding ways to capture the experience—or a modest proxy of it—so that future generations will get a glimpse of how early digital artworks were created, experienced, and interpreted. So much of new media works' cultural meaning derives from users' spontaneous and contextual interactions with the art objects. Espenschied, et al.[14] point out that digital artworks relay digital culture and "history is comprehended as the understanding of how and in which contexts a certain artifact was created

and manipulated and how it affected its users and surrounding objects." For a work to be understood and appreciated, it is essential for the archiving institution to communicate a cultural and technological framework for interpretation. As one user survey respondent noted, some works that come across as mundane now may have been among the highly innovative trailblazers of yesterday. Given the speed of technological advances, it will be essential to capture these historical moments to help future users understand and appreciate such creative works.

The PAFDAO survey of users of media archives affirmed the importance of institutions like the Rose Goldsen Archive, which is able to provide a breadth of media technological, historical, and cultural contexts to researchers and educators through its extensive and accessible collections.[15] It also underscored the need for archiving institutions to be in contact with one another, and to be conscious of the need for greater integration of discovery and access frameworks across multiple institutions as they move forward in developing new preservation plans and access strategies for their collections. Providing appropriate cultural and historical contexts for understanding and interpreting new media art is part of each institution's individual mission, but also a matter of collective importance, given the rarity of such collections, the numerous challenges of establishing preservation protocols, and the overall scarcity of resources. As we conclude, we must emphasize that, as artists have increasing access to ubiquitous tools and methodologies for creating complex art exhibits and objects, we should expect to see an increasing flow of such creative works to archives, museums, and libraries. It is nearly impossible to preserve these works through generations of technology and context changes. Therefore, diligent curation practices are going to be more es-

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1 Delve, J. et al. (2012). The Preservation of Complex Objects. Volume One: Visualizations and Simulations.

2 Kirschenbaum, M. et al. (2010). Digital Forensics and Born-Digital Content in Cultural Heritage Collections. CLIR.

3 An early version of this report is available at DSPS Press: the blog of Cornell University Library's Division of Digital Scholarship and Preservation Services. See "Interactive Digital Media Art Survey: Key Findings and Observations: DSPS Press."

4 The Goldsen Archive's holdings range to include media formats such as reel-to-reel videotape, floppy disk, database artworks housed on external hard drives, and works of net.art. All of these formats pose unique and significant preservation challenges. For more information, please see the Goldsen Archive website.

5 Murray, T. (2008). Thinking Electronic Art Via Cornell's Goldsen Archive of New Media Art. NeMe: The Archival Event.

6 Lange, A. (2012). KEEP Strategy Paper.

7 Out of 170 respondents, 80 fully and 32 partially completed the survey, and 58 took a quick look without responding. We suspect that the incomplete survey indicates a combination of curiosity and unfamiliarity with the program area, as media art research, curation, and practice still constitute fairly specialized fields. Only twenty-four respondents indicated that their institutions include born-digital interactive media artworks and artifacts in their holdings. Several respondents who identified as curators indicated that born-digital interactive media would fall outside the scope of their collections. In some cases, they also noted that procedures for providing access to such materials are prohibitively complex or unsustainable.

8 MacNeil, H. Wei, C., Duranti, L., Authenticity Task Force Report. InterPARES.

9 Dietrich, D., Adelstein, F. Archival science, digital forensics, and new media art. Volume 14, Supplement 1, August 2015, Proceedings of the Fifteenth Annual DFRWS Conference. http://doi.org/10.1016/j.diin.2015.05.004

10 For further information and documentation please see http://imappreserve.org/, http://variablemedia.net/, http://www.tate.org.uk/about/projects/matters-media-art, and http://www.incca.org/

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12 Engel, Deena, and Glenn Wharton (2014). Reading between the Lines: Source Code Documentation as a Conservation Strategy for Software-Based Art. Studies in Conservation 59(6): 404—415. http://doi.org/10.1179/2047058413Y.0000000115

13 Rinehart, Richard, and Jon Ippolito, (2014) Re-Collection: Art, New Media, and Social Memory. Leonardo. Cambridge, Massachusetts: The MIT Press.

14 Espenschied, D., Rechert, K., Valizada, I., Von Suchodoletz, D., Russler, N. (2013). "Large-Scale Curation and Presentation of CD-ROM Art", iPRES 2013.

15 Cornell University Library's commitment to provide broad and democratic access to its special collections was a key reason why founding Goldsen Archive curator Timothy Murray located the Goldsen collections within the library. Cornell's Division of Rare and Manuscript Collections has notably open policies for user access; see http://rmc.library.cornell.edu/ for more information.

Institutional Assessment of Student Information Literacy Ability

» A case study at Hong Kong Baptist University Library

BY CHRISTOPHER CHAN

Information literacy is widely recognized as a crucial competency that is necessary for success in education and in lifelong learning, to the extent that it is frequently included as an expected learning outcome at postsecondary institutions and is increasingly being incorporated into institutional mission statements (Weiner, 2014, p. 5). Coupled with the rising demand for accountability among stakeholders in higher education, significant attention has been paid to the assessment of information literacy. At Hong Kong Baptist University (HKBU) Library, a concerted effort has been made over the past several years to administer a standardized test of information literacy at the institutional level. This paper describes how HKBU Library has administered information literacy assessments on a large scale and provides analysis of the data collected so far. It will also critically reflect on the approach taken and discuss possible future developments.

Hong Kong Baptist University's main library building – The Au Shue Hung Memorial Library.

LITERATURE REVIEW

Widespread interest in the assessment of learning outcomes in higher education has been global trend in recent years. According to Douglass, Thomson, and Zhao (2012, p. 318), stakeholders increasingly see such assessment efforts "as a method to measure the value added, and to a large extent the quality and effectiveness, of colleges and universities." The essential premise is that institutions can use learning outcomes data to identify areas for improvement and take appropriate measures to make such improvements a reality. Such data has also been used for accreditation and accountability (Liu, Bridgeman, & Adler, 2012). It should be noted, however, that the adoption of learning outcomes assessment has not been without challenges. Liu (2011, pp. 5-7) summarized some key concerns, including the fact that there is insufficient evidence of whether scores on outcomes tests actually predict student success after graduation. Nevertheless, outcomes assessment is now entrenched at many institutions, and there is strong demand for standardized tests that can produce evidence of student learning that is comparable between institutions.

This emphasis on the assessment of student learning outcomes has had an impact on academic libraries, particularly in the way they assess their teaching of information literacy. Oakleaf (2008, p. 233) noted that libraries formerly relied heavily on input, output, and process measures to provide evidence of excellence. For information literacy efforts, such indicators may have included the number of teaching librarians, the total number of classes taught by librarians, total attendance, etc. However, in an environment where outcomes-based measurement is heavily stressed, stakeholders are more concerned about what students have actually learned and what they are able to do following instruction. Accountability is especially crucial where information literacy has been integrated into the curriculum, and librarians need reliable and valid data on student learning outcomes in such cases (Cameron, Wise, & Lottridge, 2007, pp. 229-230). More generally, scholars in the library profession have noted the arguments made for evidence-based librarianship and the need for a "culture of assessment" within libraries (Walter, 2009, p. 94). Efforts to meaningfully assess the information literacy ability of students can be viewed as an essential component of a holistic approach to library assessment. They also contribute to and align with institutional-level needs to assess student learning outcomes.

Standardized tests have been explored as one way to assess the learning of information literacy skills. These generally take the form of fixed-choice tests that are intended to be uniformly administered and scored. Oakleaf (2008, pp. 236-237) summarized the benefits and limitations of such tests as follows:

Benefits:

- Easy and inexpensive to score
- Collect a lot of data quickly
- Can be used to compare pre- and post-test
- Can be made highly reliable
- Can be used to compare groups of students
- Are widely accepted by administrators and the general public

Limitations:

- Do not test higher-level thinking skills
- Include oversimplifications
- Reward guessing

It should be emphasized that such tests may be less effective in assessing learning than other approaches (e.g. portfolios, performance assessments, rubrics). Walsh (2009) also highlighted the fact that, by their nature, multiple-choice questions focus on lower-level skills. However, he also noted that with care such issues can be addressed, and that multiple-choice tests offer significant advantages in the collection of data. Indeed they may be the only feasible means when attempting assessment at the institutional level. It has also been asserted that when such instruments are administered as a pre-test, they can add value to instruction by acting as a motivation for students to pay attention (Ivanitskaya, DuFord, Craig, & Casey, 2008, p. 254).

The past fifteen years have seen the development of several different standardized information literacy tests. Project SAILS is one of the best-known; created in 2000 at Kent State University, its creators also recognized the limitations of fixed-choice tests as described above, but decided that this format was most suitable to their goal of large-scale testing (Salem & Radcliff, 2006). The SAILS test proved to be popular, and by 2007 it was in use at 83 institutions (Lym, Grossman, Yannotta, & Talih, 2010). Other tests that have emerged include the Research Readiness Self Assessment (RRSA) developed by Central Michigan University (Ivanitskaya, Laus, & Casey, 2004), the Information Literacy Test prepared at James Madison University (Cameron et al., 2007), and an unnamed assessment tool created at the University of Maryland (Mulherrin & Abdul-hamid, 2009). Although the author could find no comparative study of these tests in the literature, all of them make reference to the ACRL Information Literacy Competency Standards for Higher Education. The tests mentioned above have been rigorously assessed for reliability and validity, and can be considered useful tools for librarians in the assessment of their information literacy programs.

Despite the widespread availability and application of these tools, which have the major advantage of being ideally suited for large-scale assessment at the institutional level, there are relatively few reports in the literature of standardized information literacy tests being used in this way. In their survey of libraries that had made use of Project SAILS, Lym et al. (2010, p. 182) noted that a significant majority used convenience sampling when administering the test. They speculate that this is the case because librarians primarily rely on their personal relationships with "library-friendly" faculty for access to students. This means that librarians can generally only administer tests to students enrolled in the courses of such faculty, which will often not be representative of the student body as a whole. Similarly, studies that have focused on the RRSA have also been restricted to small convenience samples (Ivanitskaya et al., 2008; Mathson & Lorenzen, 2008). The relative scarcity of studies making use of representative samples is a concern. As noted by Schilling and Applegate (2012) without systematic access to learners, it is impossible to implement rigorous research methodologies. There are some examples in the literature of standardized tests being administered to larger populations (Mulherrin & Abdulhamid, 2009), but additional studies would further enrich our understanding of the utility of this form of information literacy assessment.

The present study seeks to make a contribution in this area by reporting on the results of a large-scale administration of the RRSA at HKBU designed as a pre- and post-test model using large samples representative of the undergraduate student body. As most previous studies have been undertaken in North America, the HKBU project may be of additional interest as a study of information literacy assessment in a Hong Kong Chinese cultural context.

BACKGROUND

HKBU is a relatively small government funded university with roots as a liberal arts college. In September 2008, the University approved a set of Graduate Attributes that all students should attain by graduation. Information literacy was included among these attributes (Centre for Holistic Teaching and Learning, 2013). The University Library recognized that the inclusion of information literacy as a Graduate Attribute warranted an effort to gather evidence that this goal was being achieved, and that librarians were well placed to take the lead. In 2010, the librarians examined the available standardized information literacy tests, and they determined that the Research Readiness Self-Assessment (RRSA) would best fit the needs of the Library and the University. Since 2011, the RRSA has been administered to all attendees of the Library's freshman orientation workshops. As attendance at this workshop is required by the University, the Library has been able to gather comprehensive baseline data on the information literacy skills of incoming students. In these administrations, freshmen students generally perform poorly, as might be expected of students who are new to higher education. While useful in demonstrating a clear need to support students in the development of their information literacy skills, the Library's intention with the RRSA from the start was to also administer the test to non-freshman undergraduate students. We wished to demonstrate improvement in this key competency by comparing the results with those of the freshman students. Such evidence of improved student information literacy skills was welcomed, given the emphasis placed on assessment by university administrators and by other external bodies.

Unfortunately, the Library lacks an opportunity akin to the freshman orientations that would allow it to comprehensively reach other undergraduates. An initial experiment in 2012 to have final year students complete the RRSA on a voluntary basis failed. The response rate was far too low, and within the convenience sample certain groups of students were conspicuously overrepresented. Comparisons with freshman data were invalid, and no conclusions could be drawn. After reviewing possible options to obtain better data, the Library partnered with the University's Centre for Holistic Teaching and Learning (CHTL). As CHTL is also active in administering their own standardized student tests, the two units were well-positioned to collaborate. As a result, they worked together to administer a battery of standardized tests to a carefully selected group of non-freshman undergraduate students in March 2013.

METHODOLOGY

The investigators decided to compare the results of freshman and second year students to provide evidence of continuous improvement in their information literacy abilities. A longitudinal approach was possible because the Library had already been administering the RRSA to incoming freshman students since 2011, and had comprehensive RRSA assessment data for the AY2011/12 cohort. At the time of the e-assessment exercise in March 2013, these students were coming to the end of their second year of study. By retesting a sample of these second-year students, it was deemed possible to directly compare the progress of their information literacy abilities. Although the students were given an identical version of the test that they took as freshmen, the investigators were unconcerned that this would be a factor in their performance; 18 months had elapsed since the first administration, and students were unlikely to remember the test questions. Furthermore, students only received general feedback after completing the original RRSA; they did not receive answers to individual questions. As noted by Ivanitskaya et al. (2008), students' prior experience with the RRSA should not have a significant impact on their performance on the second administration.

Data was also gathered for third year undergraduate students. Since these students had begun their studies in 2010, no baseline data was available to determine their improvement since their freshman year. However, their inclusion was intended to provide some insight into how senior students performed, as compared to their younger counterparts.

As noted, the first administration took place during a required library orientation session for freshman students in August 2011. One hour was allotted for these sessions, including the completion of the RRSA. The test was given under standard examination conditions; students had to work on their own. Students who were not able to complete the RRSA in class were able to save their progress and were given a one week deadline to complete it at home. The approach described here can be described as saturation sampling; an attempt was made to conduct a complete census of the population under study. Nevertheless, a 100% completion rate was not achieved, as there was never 100% attendance at the orientation sessions. In total, 1170 valid results were obtained from a total 1400 students. This 83% participation rate was considered very high.

The logistics of the second administration that took place in March 2013 were more challenging and would not have succeeded without the collaboration between the Library and CHTL. As there were no required Library sessions for non-freshman students to attend, and a voluntary approach was not feasible, the investigators decided to pay students for time spent completing the RRSA and other standardized tests. This was the only way to ensure a sufficient response rate. However, this approach could not be used to test the entire cohort for reasons of organizational and budgetary constraints. Instead, a sampling approach was used instead, and care was given to ensure that this did not introduce systemic biases: for example, the inclusion of a disproportionate percentage of high or low GPA students, which might have skewed the comparative results. To control for such biases, CHTL selected students for inclusion in the sample based on two criteria: – (1) the Faculty/School to which the student belonged, and (2) their cumulative GPA. This ensured that the students were representative of the entire cohort in terms of both disciplinary area and academic performance. As with the administration to first-year students, the test was taken under standard examination conditions.

RESULTS

A method of comparing each sample's ability to meet different performance cut-off points was employed for the purpose of assessing the overall performance of students taking the RRSA. The Library had previously used this approach to analyze the performance of freshman cohorts. The method involves determining the proportion of students that are able to achieve a certain percentage score on the objective right/ wrong questions included in the RRSA (the RRSA also includes some attitudinal questions, which are not considered in the calculation of the score). For example, the figure for the 50% cut-off point shows the proportion of students in the sample who answered at least half of the objective questions correctly. This type of analysis has the benefit of progressively highlighting differences in performance that would not be readily apparent if we simply looked at the average scores for each cohort.

Table 1 presents the results of this analysis. To recap the description in the Methodology section above, there were three sets of results. The first set was for freshman students entering the University in 2011, where the RRSA was administered in August (2011 Freshmen). The second set was for a representative sample of this same group of students in 2013, with the test being taken in March (2013 2nd Year UG). The final set of results was obtained for third year students at the same March 2013 administration (2013 3rd Year UG).

As described, it has been HKBU Library's experience that freshmen students perform poorly on the RRSA. Although there is no defined "passing grade," a score of 70% on the assessment is regarded as an acceptable performance. As freshmen, a mere 16% of the cohort of students under study was able to achieve this level of performance. There was a clear improvement in their performance when they were tested again after 18 months, with over half of the 2013 2nd Year UG sample scoring at or above 70%. There were consistent levels of improvement at other cut-off points. Almost all 2nd

Table 1—Comparative Overall Performance of Students on the RRSA as Freshmen and as Non-Freshmen Undergraduates

Cut-off Point	2011 Freshmen (n=1170)	2013 2nd Year UG (n=193)	2013 3rd Year UG (n=177)
50%	84%	97%	96%
60%	48%	82%	87%
70%	16%	53%	63%
80%	3%	21%	31%

Table 2—Comparative Performance of Freshmen and Non-Freshmen Undergraduates in the Six RRSA Categories

		2011 Freshmen (n=1170)		2013 2nd and 3rd Year UG (n=388)		Change in performance		
RRSA Category	Maximum possible score	Mean score	Average percentage score	Mean score	Average percentage score	Change in percentage	Change in score	t-value
Categories measuring knowledge and skills (objective):								
Evaluating information	6	2.55	42.50%	3.62	60.33%	+17.83%	+1.07	4.72***
Obtaining information	28	17.57	58.57%	21.11	70.37%	+11.80%	+3.54	1.97*
Understanding of plagiarism	14	9.34	66.71%	10.10	72.14%	+5.43%	+0.76	0.53
Categories measuring experience, attitudes, and beliefs (subjective):								
Reliance on free Internet browsing	50	26.87	53.74%	24.46	48.92%	-4.82%	-2.41	1.67
Perceived research skills	40	25.07	62.68%	25.44	63.60%	+0.92%	+0.37	1.99*
Research and library experience	33	12.2	36.97%	16.55	50.15%	+13.18%	+4.35	3.27***

1. Readers will note that this figure is not consistent with those presented in Table 1 (193+177 = 370). This was due to 18 records not being included in the cut-off analysis for various reasons (e.g. final year students in a four-year programme were counted as 3rd Year UGs). These results unfortunately could not be excluded from the performance analysis, but given the small number of records the impact is minimal.
2. An independent sample t-test was performed using SPSS 20.
3. Note that in this category a lower score indicates less reliance on the free Internet for research.

Year UGs (97%) were able to achieve a score of at least 50%. Furthermore, one fifth of them met the 80% cut-off point, which is significant, given the negligible proportion that met this target as freshmen. While these findings are encouraging, it should be noted that the results also indicate that 47% of 3rd Year UGs did not meet the 70% cut-off point, and thus did not demonstrate an acceptable level of information literacy, perhaps suggesting that many students struggle with this particular skill set.

As a reminder, the 2013 3rd Year UG sample was made up of students who had never taken the RRSA before. Consequently, no comparisons can be made with their performance as freshmen. However, some cautious comparison can be made with the results of the other samples. This cohort performed better than the 2013 2nd Year UG, but the difference was not substantial. It was not as big as the difference between the 2011 Freshmen and 2013 2nd Year UG. These observations are consistent with the HKBU context, where required Library information literacy workshops are concentrated in the first year of study.

The RRSA system can also provide detailed performance reports in the six key areas that make up the test; in addition to the overall performance, improvements in specific areas can be reviewed. These reports also include the results of the subjective questions included in the RRSA. **Table 2** presents the results for the students tested in 2011 and 2013. It should be noted that the data collection method precluded separate results for the Year 2 and Year 3 students tested in 2013. Although this means that the results of the performance reports are less granular than the cut-off point analysis, a good picture of the improvement seen in non-freshman undergraduate students can still be presented.

The performance report also includes the data collected on the subjective components of the RRSA. While these results are not relevant to the goal of assessing information literacy ability, they do provide broad insights into the attitude of HKBU students towards research. These can help librarians better tailor their instructional and service offerings to be more effective. Examining the subjective categories, the investigators observed a small drop in reliance on browsing the free Internet for research. Although students' perceptions of their own research ability remained relatively unchanged, there was a significant increase in their experience of research and library use. This finding is interesting, especially in the context of the improvements observed in the objective categories. It would appear that students do not feel more confident despite at research despite becoming more skilled. However, it could be argued that underestimating one's research ability is preferable to being overconfident, and students will be more likely to seek help when necessary.

DISCUSSION

Librarians at HKBU were pleased to be able to provide evidence suggesting that the information literacy ability of students improves over the course of their studies. However, these results do not prove that the program of information literacy instruction provided by the Library is

solely (or even mostly) responsible for the observed outcome. What can be tentatively claimed is that over the course of the first eighteen months of their HKBU experience, students exhibited observable improvements in their information literacy abilities. This experience will have included library workshops that are a required part of the curriculum, and other forms of instruction from librarians depending on their course work. Although the results here do not provide conclusive proof that this instruction was responsible for the improvement, it does indicate that the HKBU experience as a whole is effective in developing information literacy competencies. In the opinion of the author it can reasonably be claimed that library instruction is having the desired effect because the program is part of the students' experience specifically geared towards that development. For stronger evidence, an experiment with a control group of students that receive no instruction would be needed.

This would be challenging or even impossible to implement at the institutional level at HKBU, as it would mean excluding specific students from required parts of the curriculum. In the absence of this option, the results presented here may represent the strongest evidence of the efficacy of library instruction that could practicably be gathered.

No approach to the complex task of institutional-level information literacy assessment will ever be perfect; there is room for improvement in the way that HKBU Library approached this challenge. One potential problem is the lack of real effort by students on low-stakes assessments. Since the RRSA score does not have any impact on students' GPA, they are likely not trying their best. Liu, Bridgeman, and Adler (2012, p. 352) noted that this "could seriously threaten the validity of the test scores and bring decisions based on the scores into question." Wise and Kong (2005) suggested identifying unmotivated students by looking for low response time effort: in other words, excluding students who finished the test too quickly to have reasonably devoted an appropriate amount of effort. The RRSA administrator interface does provide the time taken for completion, so it would be feasible to filter out the results of students that complete the assessment too quickly. However, this would potentially have an impact on the sample, making it less representative of the student population.

An additional concern is the extent to which the RRSA is a reliable and valid measure in the HKBU context. Although the RRSA was professionally developed by academics, Cameron et al. (2007) suggest that institutions adopting standardized tests developed by others should collect their own evidence of score reliability and validity. Other researchers have further argued that locally-designed assessment tools are the best way to meet an institution's needs and accurately identify areas for improvement (Staley, Branch, & Hewitt, 2010). This may be true, but many institutions simply lack the resources and expertise to be able to develop such tools themselves. Another possibility that HKBU librarians have discussed with the creators of the RRSA and other librarians in Hong Kong is the creation of a version of the RRSA specifically for Hong Kong students. This would address concerns that cultural differences might impact the performance of our students on the assessment.

A broader concern is whether the RRSA itself is still a valid measure ten years on from its initial conception. Although it was designed to assess the ACRL *Information Literacy Competency Standards for Higher Education*, there is now debate within the profession as to whether these standards are still an adequate definition of information literacy. In February 2015, the ACRL voted to adopt a new Framework for Information Literacy for Higher Education. There was serious discussion around sunsetting the Standards, but this conversation was deferred indefinitely until it becomes clearer as to how the Framework develops (Williams, 2015). The *Standards* remain relevant for now, however this may change in the future. Widespread adoption of the *Framework* would present significant challenges for standardized tests of information literacy, as the Framework emphasizes those higher-order abilities that are difficult to assess via fixed-choice tests. Looking forward, it is likely that HKBU's approach to institutional assessment will have to evolve along with the profession's changing conceptions of what information literacy itself means.

Future efforts may also address Oakleaf's (2008, p. 237) critique that standardized tests lack authenticity and do a poor job of assessing higher order thinking skills. This would be particularly relevant in the context of the ACRL *Framework*. A possible approach might involve the use of standardized testing in conjunction with other forms of assessment that are recognized as reliable and valid assessments of higher order skills, such as portfolios or simulations. However, such methods tend to be significantly more time-consuming and intrusive compared to standardized tests (Walsh, 2009), and it would be challenging to integrate these methods into institutional-level assessments. Nevertheless, such avenues are being actively explored. For example, one of HKBU Library's instruction librarians is a member of a community of practice recently established by the University to explore the use of student e-portfolios.

CONCLUSION

Since 2010, HKBU Library has been making use of the RRSA to assess the information literacy ability of its students. From the beginning, institutional assessment was a key driver of this effort. The fact that several years of concerted effort were required is testament to the challenges and obstacles that such initiatives face. The data gathering and analysis process was not entirely smooth, and needs further refinement. Nevertheless, the Library has been able to collect some compelling evidence of improvement in a key Graduate Attribute, with

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non-freshman students scoring significantly higher on the assessment than freshman students. Such evidence is invaluable in helping show senior university management and other stakeholders the value of the library service.

While the methodology used was not without flaws, it allowed for the large scale gathering of data. The Library intends to draw on its experience to make further improvements in future iterations of the exercise. It should be noted that this project would not have been possible without the collaboration between the Library and the University's Centre for Holistic Teaching and Learning. The librarians involved relied on CHTL's expertise in determining a truly representative sample, and the partnership made it easier to secure resources to support the exercise. Although not the focus of the present article, this highlights the importance of partnering with other key stakeholders on campus to ensure success in institutional-level endeavors. ■

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