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MOBILE DEVICES

SERVICE WITH INTENTION

Rebecca K. Miller, Heather Moorefield-Lang,
and Carolyn Meier, Editors

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Abstract

Library Technology Reports, volume 51, no. 7, "Mobile Devices: Service with Intention," edited by Rebecca K. Miller, Heather Moorefield-Lang, and Carolyn Meier, gathers five case studies that discuss the potential of tablets, smartphones, and other mobile devices alongside real-world constraints. From a range of institutional settings, the case studies address three general areas of library work: (1) circulation and lending; (2) teaching and learning; (3) access and design. Assessment is a common theme in the case studies.

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Chapter 1

Introduction

Intentional Integration of Tablets and Mobile Devices into Library Services

Rebecca K. Miller, Heather Moorefield-Lang, and Carolyn Meier

Tablets: A (Brief) Five-Year Review

The publication of this issue of *Library Technology Reports* could almost be a birthday gift to the Apple iPad. On April 3, 2015, the iPad turned five years old; unlike most five-year-olds, though, the iPad and its siblings have influenced the way we communicate and work. For those of us in libraries, the tablet and mobile device revolution sparked by the iPad ushered in a period of excitement and exploration. We wondered how tablets might change the way we work, the way we engage with our users, and the expectations that our users bring into the library. If nothing else, we understood that tablets and mobile devices hold great promise for enhancing teaching and learning opportunities, collaborations with faculty and other colleagues, reference services, access to collections, and circulation services.

The library world was, and still is, full of trailblazers in the new and sometimes rocky terrain of mobile devices and computing. As the tablet market filled with a wide variety of models and app stores filled with an overwhelming selection of ways to use mobile devices, library and information professionals pioneered processes, systems, and strategies for integrating these tools into library services. Aside from basic technical manuals and documents, no maps existed for these mobile technology pioneers who went hands-on as they tried to figure out why and how tablet computers and other mobile devices fit into the library and higher education landscape. Indeed, over the past five years, the rapid progress of the technology has made it difficult to try to create a map that represents the most effective ways to use tablets and other mobile devices in the library setting. Creating this map, however, is exactly what the case studies in this publication endeavor to do. In our first issue of *Library Technology Reports,* which discussed integrating tablets into library services, we focused on the incredible potential for tablets and mobile devices to reshape library services, including reference and instruction.[1] This issue reframes this discussion by viewing the potential of these tools alongside real-world considerations, constraints, and concerns.

Intentional Integration

The direction and philosophy of this publication owes a debt to Char Booth's 2009 report entitled *Informing Innovation: Tracking Student Interest in Emerging Library Technologies at Ohio University*.[2] In this report, Booth identified "technolust" as the driving force for many of Ohio University Libraries' programs, which became a problem when library staff started feeling spread thin by all of the experimental programs they were maintaining and developing. In order to combat the technolust, the libraries moved toward what Booth labeled a "culture of assessment."[3] We don't want to spoil the report if you haven't already read it, but Booth made a very persuasive argument that technology decisions in libraries should be grounded in real insight into local

library, information, and technology cultures.[4] The report includes detailed information about research design and data analysis, so we strongly encourage you to read it, if you haven't already.

The one revelation from Booth's report that we will discuss here, though, relates to data that libraries often use to make decisions about technology. Booth wrote that, while making technology decisions, "many institutions bypassed local needs assessments and developed products largely on generational assumptions of changing student information and technology expectations."[5] So we could tell you that the latest Pew data indicates that 64 percent of American adults have a smartphone and over 42 percent of American adults own a tablet computer or that Educause's data shows that 58 percent of university students are projected to own tablets in 2015.[6] As interesting as those numbers may be, the goal of the case studies presented here is to inspire you to think past these big data points and to focus in on your community and your library's goals.

Case Studies of Intentional Integration

It can definitely take more work, more time, and more people to make intentional, insightful decisions based on your community and your library, but the rewards are clear. The case studies included in this issue plainly depict the role of strategy and assessment in a technology-oriented project while also explaining both the processes and project outcomes. Falling into three large categories or areas of library service, the five cases selected for inclusion in this issue discuss starting new services, stopping services that may no longer be relevant, and evolving the scope of core services through the use of technology. The categories and services described here certainly don't represent a comprehensive list of areas where tablet computers and mobile devices impact libraries, but they do offer well-defined examples of what intentional integration looks like in various areas of academic library work.

Circulation and Lending

Two of the cases in this issue describe the evolution and assessment of tablet circulation programs. Of all the ways that tablets and mobile devices can be integrated into library services, circulation programs are definitely the most visible and perhaps the most popular, as well. In chapter 2, Stephen Bollinger, Nina Exner, and Octavious Spruill of North Carolina Agricultural and Technical State University share the story of the evolution of the tablet loan program at F. D. Bluford Library. Similarly, in chapter 3, Juleah Swanson describes the process for evaluating the BuckiPad project, an iPad circulation program at The Ohio State University. Both case studies outline frameworks for evaluating these programs and offer insight into how assessment data can support difficult decision-making processes. Although North Carolina Agricultural and Technical State University and The Ohio State University serve very different communities, the authors' findings in both cases convey uncertainty about the future of their libraries' lending programs. Overall, both cases emphasize the importance of thinking about what success looks like for a specific program on a specific campus.

Teaching and Learning

In chapter 4, on how tablets were used to evolve the instruction program at Santa Fe Community College, Deana Brown details the methodology used by librarians to inform changes to their program. The four-year evolution of this instruction program included changes in technology and classroom space, but it was driven by both a learning philosophy and an attention to user needs. The most significant thing about this case study is that it demonstrates the power of a clear vision and philosophy. Brown's depiction of the vision and philosophy that drove the changes at Santa Fe Community College also emphasizes the role that assessment plays in enacting a particular philosophy and measuring whether or not a program has achieved success.

William Hicks's description in chapter 5 of the process of building a mobile device testing and development lab at the University of North Texas (UNT) Libraries links this project to user needs as well as strategic goals at the state level. Pointing to a directive from the Texas State Library and Archival Commission to ensure that Texas libraries developed mobile web options valuable to their users, Hicks writes that the lab developed at UNT Libraries has both internal and public objectives. Data gathered at the community level allowed Hicks and his team to make appropriate decisions related to the technology and services offered by the lab. Hicks stresses that the mobile device testing and development lab at UNT Libraries endeavors to represent both a learning environment for users who are aspiring developers and a testing lab for the development of internal projects that would enhance the design of the libraries' mobile presence and user access. Because of its dual purpose, Hicks's project spans the categories of "teaching and learning" and "access and design."

Access and Design

Tablets and mobile devices change the ways that users experience and access collections and other

library resources. Hicks and his colleagues at UNT addressed this consideration through the development of a mobile device testing and development lab; Aaron Ganci and John McCullough of OCLC, however, share in chapter 6 the process of actually developing solutions that deal with providing access to library content on the mobile web. Specifically, Ganci and McCullough explain different approaches to working in responsive web environments. More importantly, they discuss why they chose to use a specific approach called "mobile-first" to guide their methodologies and processes for gathering input from stakeholders and usability data from a beta site.

While they focus on two different pieces of the access and design area, the chapters authored by Hicks and by Ganci and McCullough agree that the diverse range of mobile technologies and tools is a challenge for libraries, library users, and even library companies like OCLC. The authors' emphasis on the many different tablet models, software, and other tools available serves to underscore the importance of understanding characteristics of user groups and communities in order to be able to make the best decisions when there are many options. Being intentional and strategic, though, when transforming library services by integrating technology can and should include additional components or best practices for ensuring that the changes being made are beneficial to the user communities and impactful for the library organizations involved.

Best Practices for Intentionally Integrating Tablets and Mobile Devices

Although the case studies in this issue come from a wide variety of institutions and perspectives, their stories share certain features. The approaches and methods described in these cases converge on a number of elements critical for being intentional about how technologies like tablets and mobile devices are integrated into library services. While perhaps not a complete map for navigating territory fraught with new technologies, the best practices identified here do serve as guideposts or trail markers for anyone ready to move out of the exploration phase and toward something more strategic and intentional.

Working within the Big Picture

A number of the authors who wrote case studies for this publication mentioned the role of considering institutional or state-wide strategic goals and directions. William Hicks connects the development of UNT's mobile device testing and development lab to a Texas State Library and Archival Commission goal. Similarly, Deana Brown ties changes in the library instruction program at Santa Fe Community College to reports from the New Mexico Department of Higher Education and the New Mexico State Library. In both of these cases, the changes and new services were supported at every level in the organization because they related to goals that were bigger than a single service.

State-, university-, and even library-level missions and strategic plans can offer direction for new or transforming library services. Reviewing these plans, statements, and other documents can be an important first step in making decisions about how to integrate new technologies. Furthermore, connecting programs and services to specific "big picture" goals can help you acquire the support from leaders and administrators and the buy-in from collaborators and users that are needed in order to get innovative projects off the ground.

Understanding the Community

Char Booth warns us of the danger of bypassing local needs assessments in favor of relying on perceptions and data about nationwide or even worldwide trends.[7] Each of the case studies included here describes the special attention that the authors paid to understanding their local community and the specific user needs within that community. A number of the authors used surveys to gather this data; a few, like Aaron Ganci and John McCullough, used focus groups and workshops to gain a better understanding of community needs. William Hicks even turned to usage data gathered through Google Analytics to assess user needs and behaviors.

Regardless of the research methodology or type of data that you choose to use, the simple act of paying attention to user behaviors, needs, and characteristics is the important thing. A lot of relevant data may already exist in your library and on your campus that you would be able to use for gaining insight into your community. Campus enrollment demographics, technology requirements, and even career services information will be able to provide insight into your users that will allow you to be more intentional in the technology choices that you make.

Seeking and Building Collaborations

Nearly all of the cases described here also mention collaborating with colleagues as an important component of success. Seeking out and working with individuals who can assist with making your project a reality is a process that also ensures different perspectives and skill sets are represented in the project development. In her case study on the pilot lending program at The Ohio State University Libraries, Juleah Swanson notes

that the project was dependent on a close collaboration among various library departments, including acquisitions, IT, and circulation.

Part of intentionally integrating technologies into library services can and should involve intentionally including colleagues from within the library or the community who can help support and guide the program. Because tablets and mobile devices, in particular, rely on wireless networks and other IT-related factors, it can be especially important to collaborate with the groups or departments that handle these issues in your library. If technology-integration projects are related to both institutional goals and community needs, though, finding enthusiastic collaborators should not be a problem.

Assessing

Assessment goes hand-in-hand with understanding the community and working within the big picture. By understanding specific user needs and specific institutional and organizational goals, describing and measuring success is not difficult. Again, almost all of the case studies included in this publication assess their programs and projects on some level. The two tablet lending programs, for example, use surveys and circulation data to gauge the impact of the programs and make difficult decisions about the future of the programs. As these two case studies demonstrate, developing an assessment plan and timeline at the beginning of a project involving tablets or mobile devices is the best way to be intentional about evaluating whether or not the program is actually meeting organizational or user needs. Assessment can be included as a means for making improvements to a program or for deciding whether or not to continue with a program.

Knowing When to Stop

If assessment data shows that users' needs aren't being met or that a library's investment in a particular project or service is too much, then it may be necessary to discontinue the project or service. The assessment data from both cases describing tablet lending programs indicated that these programs may not be as useful or as realistic as their creators originally thought. In one case, decreasing circulation statistics pointed to changing user needs, and in the other case, the library may not be able to continue to invest in maintaining and upgrading hardware and software.

It can be sad and frustrating to realize that a program, however intentionally developed, may not be working out in reality. However, making the decision to stop a program that isn't what your library or community needs is also intentional and strategic. Discontinuing one program can often mean that resources are available for a new project that may be more valuable and impactful for the library and its surrounding community. Furthermore, it can mean that individuals involved in new projects integrating tablets, mobile devices, and other technologies are not spread too thin and really are able to focus on thinking about the big picture, understanding the community, building collaborations, and assessing future projects.

Final Thoughts

While the editors and contributing authors worked hard on this issue, the world of technology continued to change and evolve. With the announcement of the Apple Watch in September 2014, the technology landscape has again shifted to include mainstream discussions of wearable tech and other trends that once belonged solely to the realm of science fiction. It can be challenging to keep up with technology trends and revolutions, but the library world's response to the appearance of tablet computers and other mobile devices has been inspiring. We embraced this new technology as a way to promote the core values, ethics, and competencies that have always driven the library profession. As we move from questions to exploration to strategic action, it is clear that the processes that we develop now will benefit us long after tablet computers have evolved into the next new thing that we need to learn how to integrate into our library services in effective, impactful, and intentional ways.

Notes

1. Rebecca K. Miller, Carolyn Meier, and Heather Moorefield-Lang, eds., "Rethinking Reference and Instruction with Tablets," *Library Technology Reports* 48, no. 8 (November 2012).
2. Char Booth, *Informing Innovation: Tracking Student Interest in Emerging Technologies at Ohio University* (Chicago: Association of College and Research Libraries, 2009), www.ala.org/acrl/sites/ala.org.acrl/files/content/publications/booksanddigitalresources/digital/ii-booth.pdf.
3. Ibid., 2.
4. Ibid., 103.
5. Ibid., 9.
6. "Device Ownership over Time," Pew Research Center website, accessed May 26, 2015, www.pewinternet.org/data-trend/mobile/device-ownership; Eden Dahlstrom and Jacqueline Bichsel, *ECAR Study of Undergraduate Students and Information Technology, 2014*, research report (Louisville, CO: Educause Center for Analysis and Research, October 2014), 15, figure 6, http://net.educause.edu/ir/library/pdf/ss14/ERS1406.pdf.
7. Booth, *Informing Innovation*, 9.

Chapter 2

Trying to Measure Success

A Mid-size Academic Library Grapples with Assessing a Popular Tablet Loan Project

Stephen Bollinger, Nina Exner, and Octavious Spruill

Introduction

Customer support with technology has long been a mainstay of academic libraries. Tablets are an increasingly important technology across society and learning environments, and so libraries are responding with support and services for tablets and other mobile technologies. In 2010, the year that iPads were released, North Carolina Agricultural and Technical State University's F. D. Bluford Library purchased its first set of iPads to begin a student iPad loan pilot, which was soon joined by a faculty loan project and finally an expanded student iPad loan project. The university's strategic plan, *Preeminence 2020*, with its emphasis on support for intellectual climate, excellence in the classroom, partnering for increased efficiency, and support for creativity and professional skills development in emerging technologies, motivated the library to offer then-novel tablet technologies.[1] For all of these reasons, the library has steadily grown its efforts to empower students and campus staff and faculty to become familiar with emerging mobile technologies.

However, this growth of efforts to meet customers' needs can easily outpace strategic and assessment initiatives. Particularly in mid-sized universities, implementation often takes most of the personnel time, leaving little opportunity for assessment. At Bluford Library, the mobile lending and faculty and staff mobile technologies programs have been in place for four years. It is time to assess progress and decide whether to continue the program or phase it out.

Assessment Planning and Framework

Although the Bluford Library philosophically values a full culture of assessment, its desire to assess often outstrips practicality. The library purchased twenty iPads with the intent to circulate them to students and investigate their suitability in a higher education environment. Evaluation was a central component of the original proposal, but that initial evaluation by necessity focused on managing the staff time involved in supporting the project. Measures included tracking and optimizing the amount of labor per circulation and the number and nature of student support incidents. Additionally, the focus of the program was to allow the students the flexibility to truly evaluate the devices throughout their academic life, which meant they were encouraged to use them for coursework and entertainment purposes, initially with a three-day loan period.

With the success of the original yearlong pilot, a proposal was developed to expand the project. Thirty third-generation iPads were purchased for student circulation, followed shortly by ten fourth-generation iPads specifically for faculty and staff circulation, and new supporting technology (a charge-and-sync

cart and Macintosh computer for device management) was deployed. A cost-benefit analysis revealed that upgrading the supporting technology would result in both the reduction of labor costs per circulation and the ability to expand the program without requiring additional staffing. The improved system cost $2,500 at the time, but saved $16.63 (equivalent) in reduced labor costs per circulation. A mere 151 unit circulations were enough to recoup the cost (in equivalent value of labor) and give 100 percent ROI. We had more than ten times that many unit circulations.

As a result of our cost improvements, the evaluation focus of this second phase shifted to the borrower experience. Each iPad included a link to an online user survey, and an observational study of the apps (tablet software applications) each student installed was undertaken. Each school year, a summative evaluation helped maintain the focus on providing a valuable service, benefitting the university community while remaining sustainable and manageable for the library.

Finally, in the third year of the program, the first equipment losses were sustained, prompting an investigation of the circumstances. High-risk students were found to be in their first semester and near withdrawal from the university, usually withdrawing in the middle of the school year. This last factor, withdrawal from the university, is the main reason why lost equipment could not be recovered and represents major losses for the program.

Bluford Library has now come to a decision point in these programs, to assess whether to grow or scale back the program. The project demands a midstream assessment rather than a full-cycle integrated assessment because it is an ongoing program. Therefore, this analysis needs a generalizable assessment approach to organize and track what is known so far. An ideal approach seems to be applying Kaplan and Norton's original Balanced Scorecard approach in its broadest possible application to organize the findings.[2]

This broad use of the Scorecard applies Kaplan and Norton's four dimensions: the financial perspective, the internal perspective, the innovation and learning perspective, and the customer perspective. This analysis looks at how these interact and attempts to document the linkages between perspectives. The goals are drawn from departmental, library, and campus strategic plans and are assigned as closely as they can be to a scorecard dimension. The measures that can be computed are also assigned, adding impressions where no direct measures are available but with notes so that these "soft" measures are to be given less weight.

Although many different Balanced Scorecard frameworks have been created since then,[3] for these purposes the original is sufficient to lend some strategic structure to the assessment. This implementation is not rigorous, and the balanced scorecard is for insight, not scholarly rigor.[4] The goal is not deep scholarship but to frame whether this program has been sufficiently valuable enough to continue. This is not a perfect example of evaluative analysis, but it is a realistic one.

Therefore, the analysis below is organized according to the four dimensions of the Balanced Scorecard. Based on the classic Scorecard approach, each section opens with a goals and measures table (or "scorecard"). This scorecard table lists the goals of the program that pertain to that analytical dimension and then describes what "measures" or data and observations we have about the goal.

The Scorecard Assessment

Financial Perspective

Evaluating the financial perspective encompasses not only the direct costs of purchasing, outfitting, and maintaining the devices, but also the indirect costs of staff time to process each circulation and provide support to borrowers (see table 2.1). Additionally, late fees and fines for damaged, missing, or incompletely returned devices need to be determined. Costs in staff time, workflow burden, and replacement delays also have impacts on customer and internal perspectives, so it is important to look at these indirect costs rather than only the direct costs of a tablet.

A primary initial risk, given the significant costs of purchasing the tablets, was deciding whether to allow the devices to leave the library building. One purpose of the initial pilot was to determine what loss rates might be for a larger program with more devices. The initial one-year pilot, with twenty tablets circulated with a three-day loan period, suffered only one damaged device, ironically from a faculty loan. Lost or damaged accessories, especially charging cables, accounted for more costs than repairing or replacing tablet devices.

The tablets themselves are not the only direct cost. Decisions made about the service affect direct costs such as apps, carrying cases and covers, support equipment and software, replacement accessories, and whether staff will be assigned or hired to sustain the program. Each of these decisions directly affects the other quadrants of analysis. For instance, providing a device without apps beyond the factory default was deemed to lower the educational and learning value of the program. Unfortunately, due to the novelty of the App Store ecosystem, purchasing apps was initially not possible. So only free apps were selected and installed in the initial configuration. Customer privacy and security were also priorities of the program. To ensure privacy and secure customer usage data, the library implemented centralized iPad

Table 2.1
Financial perspective summary

Goals	Measures
Provide a new technology for users without overburdening finances or staff.	High usage rates (close to 2,000 circulations in 3 years) for modest initial outlay.
Deploy iPads in a way that complements current workflows.	No additional staff required. However, the new workflow added 75 minutes processing per circulation initially (later reduced to 15).
Maximize user benefits while minimizing library costs (financial).	Initially the program was a high return for the costs. Recent increases in unrecoverable equipment losses have made the library costs significantly higher.
Maximize user benefits while minimizing library costs (staff).	Faster and simpler check-in workflow reduced staff burden, but technological processing (wipes, security, updating) remains time-consuming.

management. This required a syncing and management computer to fully wipe all possible customer data between uses. A Macintosh computer would be the usual, and most efficient, platform to manage and sync data; to control costs, a new Macintosh computer was not purchased for this purpose. Instead, a repurposed existing Windows computer was employed for syncing and managing the iPads.

The direct costs of the devices and support equipment, while significant, were secondary in the financial analysis to the indirect costs of staff time and labor to support circulating the devices. Measuring the device processing time, length of each check-in and check-out interaction, and the impact on other services yielded indirect costs that need to be managed if the program is going to be sustainable. Initial device processing time was forty-five minutes per circulation, requiring a semi-attended device wipe and restore that could be done only one at a time. By reducing the content and apps loaded onto each device, at the risk of decreasing the borrowers' experience, this was lowered to thirty minutes staff time per device per circulation.

Other customer service concerns also add to indirect costs associated with the program, most notably with novice users unable to connect to the campus wireless network. Direct observation of circulation transactions combined with staff tallying iPad support questions were used to measure and evaluate staff labor costs, revealing that over 30 percent of borrowers immediately requested assistance connecting to the wireless network, creating congestion at the Access Services desk. Ultimately insights like these were used to determine that investing in direct costs, such as a sync-and-charge cart and a Macintosh computer for device management, would pay for themselves by improving the borrower experience while further reducing staff time per circulation to fifteen minutes.

The final lens of financial analysis involves program fines and fees and balancing fair assessments against the program devolving into an inexpensive iPad rental program for borrowers. Borrower surveys, along with a high percentage of circulations yielding late fines, revealed a strong desire to borrow the devices for longer than the initial three-day loan. Loan renewals were dismissed as a solution both because of the program imperative to provide loans to as many borrowers as possible and because of the desire to ensure that renewals did not generate additional staff support transactions.

While the fees were lucrative to the library, the goal of the program was to self-sustain, not generate revenue. Generated funds were used to replace the corresponding missing or damaged accessories. In 2014, however, devices were unreturned for the first time, and analysis shifted to whether fines and fees were in effect discouraging scofflaw borrowers from returning the iPads. Throughout the program, late fees were capped at approximately $120, coupled with fines equaling the replacement cost of the iPad and accessories, with the goal being the return or replacement to circulation of the device. Unfortunately, the common thread of all six incidents were students who left the university, meaning registration holds and other last-resort measures were ineffective in pressuring them to return the device or pay the fines. As of this writing, only one of the six iPads has been recovered. This has led to internal business concerns, which run counter to the early internal business enthusiasm for the program.

Internal Business Perspective

In 2010–2011, the strategic cycle prompted the creation of a new campus strategic plan, *Preeminence 2020*, which in turn necessitated revisions of the library strategic plan.[5] New committees and task forces were designated to examine the goals and objectives of the library's strategy and spearhead initiatives to facilitate change. Among the proposed initiatives, the library administration established specific action plans addressing the technology needs of library customers in response to two of the major goals of *Preeminence 2020*.

Goal one focuses on the intellectual climate of the university. The main concept of goal one is to "create

Table 2.2
Internal business perspective summary

Goals	Measures
Fulfill university strategic plan *Preeminence 2020* with support for an intellectual climate and excellence in teaching/research/service.	Campus employee (faculty and staff) use grew 46% over the course of the iPad program, and the length of the circulation period was increased in response to campus-level technology needs.
Allow customers to experience using a tablet for study, research, classes, and personal use.	Staff noted student appreciation and positive feedback; many students declared intention to purchase an iPad after checking one out from the library.
Encourage the creative exchange of ideas; increase the quality of the professional environment; commit to excellence.	Student and faculty loan programs had 1,965 iPad circulations total, vastly more than other equipment available for checkout.

an intellectual climate that encourages the creative exchange of ideas and increases the quality of the professional environment."[6] The action plan that the library constructed was to "acquire and circulate new mobile devices in support of instruction, learning and scholarship."[7] From an internal business perspective, acquiring the first set of twenty iPads was a grand step forward toward encouraging the exploration of emerging technologies and their potential for intellectual exchange and creative discovery (see table 2.2).

Goal two focuses on excellence in teaching, research, and engagement. The main concept of goal two is "commit to excellence in teaching, research, public service and engagement."[8] The action plan that the library constructed was to "Partner with DoIT [the Division of Information Technology] to enhance faculty development in innovative approaches to use of technology in the classroom."[9] In light of successes in the initial phase of the iPad program, library and DoIT staff accomplished this by partnering to increase the number of iPads as well as deploy the management computer and cart, supplied through DoIT and implemented through library services. The library expanded the program again through relationships with other campus departments, including the Division of Student Affairs and the Academy for Teaching and Learning, which generously provided iPads for student use as well as the faculty and staff program.

The main goal of the iPad checkout program is to allow customers to experience using a tablet for study, research, classes, and personal use. Policies and procedures were created to ensure a smooth circulation process of the iPad devices. Even with strict rules and regulations in place, the iPads have been very popular with faculty and students. Library statistics show 1,965 iPad circulations over a three-year period. Many students thanked the library for the iPad service and gave positive feedback. Several students, faculty, and staff actually purchased an iPad after checking one out from the library.

iPad circulation statistics (from 2011 to 2014) show that customers are using the iPad equipment. Numbers show that customers preferred checking out the iPads over other technology equipment (Amazon Kindles and Sony E-readers). Since the introduction of the iPads, data shows the other equipment experienced a 42 percent decrease in usage. Incredibly, the data shows that the iPads were circulated over 1,400 more times than the other equipment. Unequivocally, this proves that the iPad program has fulfilled strategic hopes as well as building an innovative service with great popular acclaim.

Innovation and Learning Perspective

While tablet computers predating iPads have been used in library contexts, a primary motivator in developing the iPad loan project was to investigate how these new tablets could be useful to students, faculty, and staff in a higher education setting. A primary issue around encouraging borrower innovation and learning involves the configuration of the devices and what content and apps to preload. The decision was made to leave the device open so the borrowers could install apps and to provide a sampling of apps and content that would guide novice tablet users. Simply providing access to iPads did not meet the criterion of innovation. The challenge, however, is effectively evaluating whether the iPad loan project provided value beyond novelty (see table 2.3).

Several strategies were adopted, with varying levels of success, to quantify borrowers' experience using the tablets. Informal sampling, such as observing checkouts and asking people returning devices about their experiences, was particularly effective. More structured approaches, such as providing a link and encouragement message on the device itself to a user survey, yielded a very low response rate (less than 1 percent, despite providing a gift card raffle inducement) but also provided insights beyond in-person

Table 2.3
Innovation and learning summary

Goals	Measures
Provide customers the opportunity to explore and experiment with iPads.	Nearly 2,000 iPad uses in three years.
Understand how customers use mobile technology and what they explore on the iPads.	App observations showed high use of social media, note-taking apps, and student planning apps initially.
Follow changes over time in customer exploration and innovation.	Year 2 showed a shift to cloud services. Year 3 showed predominantly social media with few learning or productivity apps.
Allow staff to learn how to adapt to changing requirements in mobile deployment.	Improved processing time from 45 to 30 minutes, then deployed a batch management system to increase processing speed even more.

interactions. Finally, traditional data sources such as circulation statistics are available for analysis. However, in this context they were not useful. The devices were in constant circulation and in high demand. This popularity met one minor goal of the program, that students were gaining literacy with tablet devices. However, answering the question of whether borrowers were gaining anything else from the program required different approaches.

Oddly, the most effective evaluation of innovation and learning was a less intuitive one, a census conducted upon return of the devices of the apps installed by users. Initially a one-off measure undertaken out of curiosity, this quickly became a regular activity to monitor the program. Each time the configuration of the apps and content on the iPads is updated, a census of borrower-installed apps is undertaken during the first few weeks of circulation to determine what the borrowers find useful on the devices. To maintain borrower privacy, apps were not opened nor was user data viewed, and devices returned locked (roughly 30 percent of circulations) were unable to be analyzed. Also, devices are returned around 20 percent of the time seemingly untouched, with no apps installed and no user customizations (lock screen or backgrounds unchanged, nor any apps installed). Initial results of the June 2011 census indicated that social media apps such as Twitter and Facebook were installed by over 60 percent of borrowers. Additionally, over 50 percent of borrowers installed a note-taking or student planner app. The result of each census then informs the next "build" of apps, usually done once each semester, with the goal of establishing a virtuous cycle of improved service and utility to borrowers.

As the app ecosystem has evolved and student sophistication with tablets matured, subsequent censuses have revealed new shifts. For instance, the August 2013 census revealed that students were installing cloud services apps, like Dropbox, Google Drive, and Microsoft SkyDrive (now OneDrive), revealing consistent productivity usages for the borrowed devices. However, the January 2014 census also revealed a strong trend towards casual and social uses of the devices, with dating, chat, and instant messaging apps (primarily Instagram, Skype, Snapchat, and Tinder) appearing in the census. This, combined with the first instances of borrowers failing to return the devices, may indicate that the service is no longer as innovative or fostering learning as it appears it once did. New considerations require balancing the loss of innovation and increasing costs against the service popularity.

Customer Perspectives

In the mission statement for the library, there is special emphasis on constant improvement of services, collections, technologies, and spaces. Near the start of the iPad program, the LibQUAL+ survey was administered to customers. The "need for newer technology" was the second most common desire of the respondents (see table 2.4). Out of the 340 comments, 37 percent of students desired newer technologies. Library administration studied the results and added providing students access to new technologies as a priority to the library's strategic plan. Thus the library sought to acquire new technologies.

The university has also set high goals for customer service through the *Preeminence 2020* plan. Goals one and two of the strategic plan have mandates that promote an intellectual climate and excelling in "teaching, research, and engagement."[10] Library administration adheres to those mandates. It placed a high priority on providing quality services to its customers. The library has taken great strides in achieving those goals with space and technology redesigns, including supplying its customers with new iPad mobile technologies and mobile-friendly spaces. With the analysis of circulation data, administration is able to measure the success of the iPad checkout program.

Increasing access to new technologies and customer satisfaction with library services are key goals for library administration. After reviewing data,

Table 2.4
Customer perspectives

Goals	Measures
Address customer technology needs.	37% of LibQUAL+ respondents, in responses to open-ended questions, identified a need for updated technology.
Respond to university strategic plan *Preeminence 2020* with support for an intellectual climate and excellence in teaching/research/service.	Campus employee (faculty and staff) use grew 46% over the course of the iPad program, and the length of the circulation period was increased, showing the library's response to campus-level technology needs.
Respond to customer feedback with improved services.	Service desk staff recorded high approval and consistent demand for the iPads; the library responded with a more efficient processing procedure and more iPads.

administration was very pleased with the positive circulation statistics of the iPads. Data showed that customers increasingly took advantage of the program during the 2012–2014 school years. The campus faculty and staff increased their iPad checkout numbers. There was a 46 percent increase with their number of iPad checkouts, moving from 46 to 67 checkouts. Students (PhD, graduate, and undergraduate) had a 5.4 percent increase in their checkouts, moving from 758 to 805 checkouts. Therefore, the statistics showed the devices were being used and enjoyed.

The library solicits faculty, staff, and student feedback concerning iPad usage. Students were randomly surveyed during a three-month period. The results were very positive, with 100 percent of the students loving the iPad device, 87 percent of the students mentioning that it was their first time using one, and all agreeing that they would return and use it again.

Interviews with circulation staff members reinforced the positive feelings of the student body. Six different staff members noted the numerous and positive comments that they received from the student body over the past year. Many of the positive comments and feedback that students gave to staff members revolved around the use of apps, playing games, portability of the device, ease of use in the classroom, using Facebook, checking e-mail, using the Internet, using Google, and so on. In addition, staff members observed that when the iPads are all checked out, they receive frequent calls day and night asking for the next available iPad. Unquestionably, the statistics and the feedback from the staff and students reveal that the iPad program is a customer favorite.

Conclusion

The iPad program has meant a lot to the F. D. Bluford Library and to A&T's campus. Its impacts have been felt throughout the organization, and the library learned many valuable lessons from it. Strategic, technological, and structural lessons were learned. But was it a good program, and will it continue to be valuable or should it be phased out?

Its popularity and the several improvements made along the way are strong arguments in favor of keeping the program alive. But growing losses and the costs they represent have created a concern. Additionally, as the third-generation iPad ages, hardware replacement costs are daunting. Increasing this concern, students' innovative and intellectual uses of the iPad appear to have dropped off as the tablets become less of an emerging technology and more of an established one. Despite improvements, staff time in the program is still considerable and has started to increase since equipment losses have required staff time to attempt (unsuccessfully in several cases, as noted above) to reclaim them. So there are a wide variety of arguments for and against continuing the program.

Considering the popularity of the program and the library's dedication to customer service, if costs were not an issue the program would certainly continue. Extending the program will require purchasing current iPads capable of running the next expected versions of the iPad operating system. If fiscal realities allow for ongoing purchases, this popular program will surely be continued. However, in the current economic environment, it is difficult to be certain whether the program will be phased out or not.

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Chapter 3

The BuckiPad

A Case Study on Evaluating iPad Circulation and Cost per Use at The Ohio State University Libraries

Juleah Swanson

Introduction

Enthusiasm around mobile technology and its applicability for student learning and engagement has flourished on The Ohio State University (OSU) campus. In the spring of 2012, OSU launched the Digital First initiative, aimed at transforming classroom and learning experiences for a student population of over 57,000 through use of innovative technologies. The Office of Distance Education and eLearning at OSU wrote that Digital First has "worked with the Ohio State community to develop and deliver mobile solutions for anytime, any-place learning. These include free content from iTunes U, low-cost digital textbooks, assistance with iPad deployment."[1]

A fascination with iPads in transforming the college experience is particularly pronounced at OSU. An active community of over ninety faculty and staff are engaged in sharing best practices on using iPads in the classroom. The OSU marching band has garnered tremendous press coverage for a student-led initiative to use iPads to design, practice, and perform phenomenal halftime routines, culminating with an appearance in an iPad Air commercial.[2] OSU assistant professor Nicole Kraft, from the School of Communications, has been featured in a *Washington Post* article based on her unique approach to taking attendance via Twitter, a practice enabled due to the deployment of iPads to all students in her journalism class.[3] In order to verify that students are actually in attendance, Kraft requires the tweets be relevant to the class content that day and contribute to the ongoing class discussions. Finally, the alternative student-focused paper *UWeekly* has referred to OSU as "iPad University" in an article about the various iPad initiatives on campus.[4]

The Ohio State University Libraries has sought to understand and participate in the campus-wide initiatives on mobile technology and student learning. Over the course of the 2013–2014 academic year, the libraries launched the BuckiPad Pilot Program to provide OSU students, faculty, and staff the opportunity to check out an iPad from the OSU Thompson Library.

What is most fascinating about the BuckiPad Pilot Program, as a case study, is that, in spite of a campus atmosphere ripe for iPad adoption, the circulation and assessment data of the pilot program did not reveal long-term, cost-effective sustainability.

Literature Review

In July 2012, Apple CEO Tim Cook stated, "The adoption rate of iPads in education is something I'd never seen from any technology product in history."[5] Higher education has participated in the rise of iPad adoption on campuses across the United States, involving not only students and faculty as individual consumers, but also at the institutional level through program, department, or institution-wide deployment. In fall 2010,

Seton Hill University, a small private liberal arts college in Pennsylvania, began distributing iPads to all full-time students, about 2,100 at the time.[6] Lynn University in Boca Raton, Florida, began loaning iPad Minis preloaded with e-textbooks for core curriculum to all incoming freshman in fall of 2013[7] and has expanded the program to all daytime undergraduates and new MBA students.[8] Institution-wide initiatives like these and the press coverage they generate contribute to a growing interest in using iPads in higher education as a way to transform the learning experience.

iPads in higher education have not come without controversy or backlash. When Stanford University's School of Medicine loaned iPads to all new students, it found that only a few weeks into the term, about half the students had already abandoned their iPads.[9] Back at Ohio State University, through a partnership with the Digital First initiative, the Ohio State Athletic Department has given its estimated 1,100 student-athletes an iPad as a way to enhance tutoring and mentoring services, as well as allow them to access athletic department and team content. Some students at OSU expressed concern over the program, suggesting that funds could be better used elsewhere.[10]

Academic libraries have also participated in the adoption of iPads in higher education through the development and deployment of iPad lending programs. University libraries across the country, from Haverford to CalTech, the University of South Florida to Boston College, Princeton to the University of Arizona, to name a few, have all developed programs that enable some portion of their patron population to borrow an iPad from the library.[11] Much of the research on iPad loan programs and academic libraries has focused on student use of iPads for academic purposes. At the University of Illinois, iPads were loaned to first-year students for one week, and their user behavior was explored through follow-up surveys and focus groups. Findings from this research include student emphasis on the importance of wireless connectivity in the classroom and the convenience and portability of using an iPad during class.[12] At Ryerson University, the library conducted research on long-term use of iPads among students through a project that followed four students who were given an iPad as part of the research for an academic year.[13] As Eichenlaub and her colleagues found, "the iPad is a hybrid device that can be used not only to consume information, but also to produce more content."[14]

What is common among academic libraries and universities is the student-focused outlook on iPads in higher education. From research to initiatives, iPads are seen as a way to transform the educational experience for students through improving access to information, enhancing student engagement, or offering alternative models for textbooks and course content at a reduced cost.

Overview of the BuckiPad Pilot Program

The Ohio State University Libraries created the BuckiPad Pilot Program through an Innovation Fund grant. This grant enables librarians and staff within the OSU Libraries to develop innovative ideas and services that have the potential to produce high value for library patrons.

The BuckiPad Pilot Program was designed to allow students, faculty, and staff flexibility in how they are able to use the iPads, while also providing them with a device that features OSU and library-curated content. Some of the features and restrictions of the program include the following:

- twenty-four-hour load periods (updated from five hours halfway through the first semester of the pilot due to user feedback)
- ability to use iPads outside of the library
- only one iPad per patron per checkout (meaning patrons are unable to check out multiple iPads at a time for classroom or group use)
- no holds allowed on devices
- devices preloaded with content and apps such as those that provide access to library resources, apps unique to the OSU community, or apps recommended for purchase by users
- choice between borrowing an iPad 2 or an iPad Mini
- charger included in loan

The BuckiPad Pilot Program ran from the beginning of fall semester 2013 through the end of spring semester 2014, with iPads available for checkout from the Thompson Library at the OSU, Columbus, campus. Ten iPad 2s and ten iPad Minis were purchased for the pilot. The development and deployment of the pilot involved collaboration among various library departments, notably Acquisitions, Circulation, and IT.

Marketing efforts for the BuckiPad pilot program included the following:

- campus press coverage in the alternative weekly paper *UWeekly*, the OSU student news program Buckeye News Now, and the Digital First newsletter
- library-developed promotions on the OSU Libraries' homepage, on digital monitors found throughout Thompson Library, and in leaflets distributed at other Columbus campus branch libraries
- a poster presentation aimed at faculty during the OSU Innovate Conference
- publicity via various social media outlets, such as Twitter, from the OSU Libraries, librarians, campus partners, and patrons

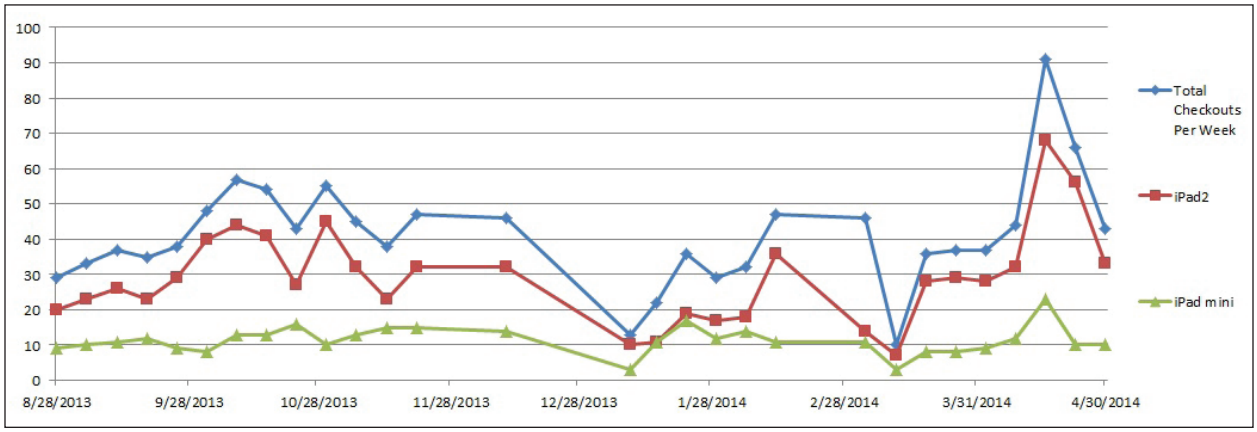

Figure 3.1
Circulation statistics per week during the BuckiPad pilot

Though reaching all 57,000 students on the Columbus campus is unrealistic, the marketing strategy aimed to target patrons more likely to borrow an iPad. For example, the digital monitors in Thompson Library targeted students who were already users of the library and who could more easily stop by the circulation desk to check out an iPad. In addition, faculty and staff engaged in innovative teaching using iPads and other learning technology were targeted in order to encourage them to promote the BuckiPad program to their students so that learning technology gains could continue outside the classroom.

Assessment

While other measures of assessment were collected during the pilot program, such as user surveys, what ultimately mattered as a measure of success was the circulation statistics and calculations of cost per use.

Circulation Statistics

From August 21, 2013, through May 14, 2014, the iPads and iPad Minis were loaned 1,444 times from the Thompson Library. On average, the iPads and iPad Minis circulated a total of 41 times per week (see figure 3.1). Though this number may sound reasonable, if availability were maximized and every device were checked out once a day, seven days a week, then the iPads would have circulated a total of 140 times per week. Thus, when considering an average circulation per week of 41 loans against the maximum allowable loans per week, this number represents only 29 percent of the total available checkouts per week. In other words, on average, 71 percent of the iPads and iPad Minis sat idle and unused during the pilot.

For the iPad Minis specifically, which were purchased for their smaller size, greater portability, and lower price point, circulation was noticeably lower. On average, the iPad Minis circulated only 11 times per week, which translates to 85 percent of the Minis sitting idle or unused during the pilot.

If lending rates had been between 60 and 90 percent of the allowable loans (or between 84 and 126 loans per week), then the program would have been seen as successful. A rate higher than 90 percent would have indicated a need to re-evaluate the number of iPads available in the pilot program. Instead, the pilot saw a circulation rate of 29 percent, which is less than half of the lowest benchmark for success. Simply put, the iPads were not being checked out at a reasonable rate, and this is problematic for a program designed specifically to loan iPads.

Cost per Use

Through a grant, the OSU Libraries invested $11,099 in the BuckiPad Pilot Program. This funding supported the purchase of ten iPads and ten iPad Minis, a Bedford power cart to charge and store the iPads, OtterBox cases for hardware protection, a Mac Mini to manage the configuration and deployment software, Apple Lightning Adapters, and apps to be preloaded onto the iPads. These figures do not take into account the labor and overhead costs of the program.

Based on the 1,444 total loans, the cost per use during the pilot program was $7.69 per loan. Circulation statistics were collected over a period of 31 weeks. If each iPad circulated once a day, seven days a week, for all 31 weeks, then the total number of loans during the pilot would have been 4,340. Based on this figure, the lowest possible cost per use would have been $2.56 per loan. If the program were to continue at the same level of use, with no additional investment, then

Table 3.1
Comparison of cost per use of the iPads based on actual and estimated number of loans

	Total Loans in 31 Weeks	Cost per Use
For actual number of loans in pilot program	1,444	$7.69
For maximum allowable number of loans	4,340	$2.56
For 90% of allowable loans	3,906	$2.84
For 60% of allowable loans	2,604	$4.26

by the second year, total cost per use over the program lifetime would have reached a more reasonable amount of $3.84 per loan, and in three years cost per use would have reached $2.56 (see table 3.1).

Discussion

When planning the BuckiPad lending program, it was not anticipated that the pilot would face a problem of low circulation. In the 2013–2014 academic year, the OSU Libraries served a student population of 57,466 undergraduates and graduate students on the Columbus campus. In addition, for calendar year 2013, Thompson Library saw a gate count of 2.26 million.[15] It was assumed that because of the sheer number of students on campus and volume at which the Thompson Library is used, the BuckiPad program would see high circulation rates and thus success.

If the pilot were to continue an additional two to three years, cost per use could have reached reasonable amount of $2.84 to $4.26 per checkout. With low usage and high cost per use, additional investment into the BuckiPad program in order to create a sustainable service is not advisable. However, the issue with the BuckiPad pilot is not only the cost. The issue is the underutilization of the iPad lending service in comparison to both the number of iPads available and the student population served. The major question that came out of this pilot is, why was circulation of the iPads so low?

With a campus culture embracing emerging technology trends like iPads and a marketing plan that was thoughtfully crafted to target potential users, neither the culture nor the promotion of the plan was an obvious reason for low circulation rates. So then, what other reasons could be driving low circulation rates of the iPads? Perhaps there is something else about the iPad and its brand that impacts circulation and use.

The iPad, originally designed as a personal consumer device, has not been branded as something to be shared. Because of this fact, perhaps the iPad is not an item conducive to traditional lending in a library. Some of the research on iPad lending begins to address this notion. Hahn and Bussell wrote that "configurability to individual needs was another key trend from results surrounding mobile apps. Students wanted the library to have apps relating to major fields of study that directly meet their assignment-level needs and can connect them with specific, useful, current course information."[16] In their article on iPad lending programs within health sciences libraries, Gillum and Chiplock wrote that "lines are blurred between personal and educational use of the iPad, as it is so efficient at both" and further suggest that librarians and faculty need to emphasize the academic value of the iPad in order to distinguish the iPad as a tool for student's educational use.[17] What both of these findings suggest is that iPad lending in academic libraries may benefit from the development of programs that embrace this hybrid notion of an iPad—a sharable device that is best suited for individual configurability, as well as one that serves both educational and personal needs.

Longer loan periods may be one way of developing an iPad lending program that embraces its value as both an educational and a personal device. As Hahn and Bussell found, "we . . . thought that one week would be sufficient time with an iPad, but as we talked with the students we recognized that they might need longer checkout times to truly experiment with the iPad and take advantage of all its features."[18] At Ryerson University, a research project studied students' use of library provided iPads during the course of a full academic year. When participants in this research project were asked about the idea of shorter-term device loans, though they were supportive, they expressed concern "due to the personalized nature of this device (email, course-ware, scheduling, music, and photos) . . . [and] also expressed concerns that it would be difficult to start anew with each loan."[19]

The question, however, is what *is* an ideal loan period? Would it be a full term or a full academic year? Furthermore, should it be the responsibility of the library to loan devices for longer periods of time, or is this an initiative better suited to another department on campus? For example, at OSU, should the libraries consider term-long iPad loans, or should iPads be loaned at the departmental level for students enrolled in courses where iPad use in the classroom is already occurring?

Conclusion

Though the BuckiPad Pilot Program did not pan out as a long-term, sustainable service for OSU Libraries, the pilot's shortcomings provided invaluable insight and perspective. The low number of loans during the pilot program challenged assumptions and preconceived ideas about students and technology trends. At

a university the size of OSU, it is no longer a valid assumption that the adage "if you build it, they will come" can apply to any student-focused project. The sheer number of students and existing high usage of the Thompson Library do not necessarily translate into high use of all services and programs offered by the libraries, such as the BuckiPad program. Instead, intimate knowledge of students and their needs, expectations, and perceptions of library services and of technology is necessary for program development.

Whether it stems from branding by Apple or from how iPads have been adopted by consumers, the iPad is a personal device and cannot be easily divorced from this image. For libraries considering iPad lending programs, it is essential to understand this concept. Structuring an iPad lending program that addresses user preference for iPads as personal devices may help to create a successful iPad lending program.

Existing research and the findings from this article suggest that students' relationship with iPads and technology in higher education is much more complex than someone might assume at first. Further research is needed on why students adopt or reject technology, in addition to the existing research on what they use and how they use it. Further research in this area could provide a deeper understanding of the role of iPads and other emerging technologies in higher education as well as providing guidance to both libraries and institutions in designing and investing in new technology initiatives.

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Chapter 4

From Sage on the Stage to Mobile and Engaged

One Community College's Evolution of Library Instruction

Deana Brown

Introduction

Santa Fe Community College (SFCC) in Santa Fe, New Mexico, has a student population of approximately 6,500 students. The campus community is served by a library director and staff consisting of 2¾ FTE librarians, a library technician, a library administrative assistant, and four work-study students. The majority of library instruction sessions are led by the reference and instruction librarian, with other staff filling in as needed. Fall semester instruction sessions increased from twenty-five to fifty-eight between fall of 2009 and 2014.

This success was the product of SFCC's librarians embarking on the process of redesigning their instruction sessions to include more experiential elements, incorporate technology, and listen to users' needs. The result was a journey that began the summer of 2011, when the reference and instruction librarian, with the assistance of colleagues, turned a critical eye to their instruction sessions.

Though the physical space was often a limiting factor, the changes in instructional design inspired librarians to seek out technology and space that was in line with their new teaching style. This led librarians to investigate how to effectively integrate technology into their instruction sessions. In the end, students, faculty, and librarians all agree a good fit was reached.

Each iteration in the evolution of instruction was comprised of three major components: instructional design, physical space, and access to technology. Each component will be covered in this chapter, while focusing on the incorporation of technology and how reassessing available space and resources improved service.

Background

According to a report from the New Mexico Department of Higher Education, in 2012, 51.4 percent of incoming college freshmen in New Mexico had to take remedial math or reading courses or both.[1] A 2012 New Mexico State Library report stated that 46 percent of the state's population was considered functionally illiterate.[2] This data translated to SFCC students being enrolled in 1,330 credit hours of just remedial reading courses alone, which according to SFCC's report on enrollment by discipline, was up almost 10 percent from 2006.[3] This ongoing trend of low literacy skills meant a good number of the incoming 800 first-time college students would need extra help to succeed in college, and librarians knew information and digital literacy skills were key to success in college and beyond.

The goals of the project evolved over time, but ultimately, librarians wanted to reach more of the student population, develop standardized experiential instruction sessions, and develop students' digital fluency by making technology an integral part of instruction. Librarians decided the best way to reach these goals was to be intentional with their changes and incorporate feedback from formal surveys,

observations, and informal conversations with faculty and students.

The Journey

Sage on the Stage

The first iteration of instruction, used from 2009 to 2011, was mostly lecture with limited demonstrations and virtually no experiential elements. Students were not engaged, and faculty members voiced a desire for sessions to incorporate hands-on time. It was also a struggle for librarians to remain motivated in a less-than-ideal class setting.

During this time period, instruction sessions were held in one of two spaces, only one of which had computers available for instructional use. Sessions were originally held in the library's Special Collections room, which was completely lined on three sides with locked glass-front bookcases, with the fourth wall being glass that looked out into the library's circulating collection. The room seated ten comfortably around a table; however, most instruction sessions needed space for fifteen to twenty students. To accommodate these numbers, the room was staged and reset for each of the twenty to thirty sessions being held each semester. The table was removed, and extra chairs were brought in from elsewhere in the library.

The lack of tables caused students to struggle to find a surface for taking notes, and the close quarters made the room become uncomfortably warm. Special Collections' lack of technology provided no opportunity for students to have hands-on time with the library's resources and increase their digital literacy skills. To provide students the opportunity to, at minimum, watch a demonstration, a projector cart with laptop was wheeled in for instruction sessions. However, the small space and the location of the room's only outlet resulted in the projector being placed too close to the screen, resulting in an image too small to see from the back. To alleviate the issue, an experiment was done with five library laptops. The hope was to have the laptop screens supplement what was being projected, provide students the opportunity to engage with technology in a meaningful way, and incorporate experiential components into the session.

One laptop was provided to each row of five students. The student sitting in the middle of the row was given the laptop and the responsibility of "driving" along with the demonstration for his or her seatmates. The result was increased engagement by those students sitting next to or using the laptop. The number of questions directed toward the instructors increased, as did the amount of interaction between students. Questions such as, "How did you get to that page again?" and "Here is where I clicked to get the citation" became the norm rather than the exception. Though the experiment was deemed a success, only five students in each class had a true hands-on experience, with another ten able to closely observe. Based on session observations, five to ten students were having an experience that was not positively impacting their digital and information literacy. The attention of these students, who were furthest from the laptops, floated in and out, and they asked fewer questions than those closer to the laptops.

It was clear from the experiment that a location with more computers was needed to provide every student the opportunity for hands-on time in sessions. The need for such a space led library staff to assess alternative locations for instruction. After weighing various options, the community college's language lab was seen as a viable alternative.

Engaged with the Sage

With its ten desktop computer workstations, the language lab seemed like it would be a good fit. Unfortunately, each station had divider walls to reduce sound traveling while students practiced speaking out loud. It was difficult to fit a full library instruction class and media cart in the lab, but there was more room than in Special Collections, and more students would have the opportunity for hands-on activities. Though the language lab was located in the library, it was under the purview of the World Languages department. After negotiations, an agreement was struck that would allow librarians to conduct sessions in the lab, as long as the reference and instruction librarian gave the chair of the World Languages department at least a week's notice before a session.

This agreement worked well, and from 2009 to 2011 over half of all instruction sessions were held in the language lab. There was more room for students, computers were available for hands-on learning, and there was room for the projector to function effectively. To maximize these features, sessions were changed to offer hands-on time for students to conduct searches on their research paper topics during class. This made sessions more relevant to students' information needs and provided a supportive environment for them to begin their research. The larger space also meant librarians could circulate and serve as a safety net as students stretched their information and digital literacy comfort zones.

Though the room was a vast improvement over Special Collections, it wasn't without its drawbacks. The language lab was set up with students facing away from the front of the room, there were enough computers for only half of the class, and group work was difficult to achieve with the dividers. There was also the ongoing issue of scheduling the room, which ultimately made it unavailable to some students. With

these concerns in mind, instruction was moved back to Special Collections with the aim of finding a dedicated instruction space. Until such a space could be found, librarians moved forward with their instruction goals, including seeking out and incorporating more technology into their teaching.

Mobile and Engaged

To better utilize funds and staff resources, the next phase in the redesign project was to be implemented in stages. The planned changes included new technology and instructional design elements combined with repurposed space and technology. New instructional design elements were incorporated that would require students to assume a more active role in instruction sessions. Mixing new iPads with a slightly outdated SMARTboard proved to increase student engagement and strengthened the case for further technology purchases. Providing students the opportunity to engage with technology not available across campus positively impacted their digital literacy by increasing their knowledge and comfort levels with new technology. The physical component was an underutilized room that would be repurposed and ultimately serve as a dedicated library instruction room.

Instruction sessions were made more experiential by developing a standard set of activities that lessened the lecture aspect and fulfilled regular instruction request needs, but could serve as a basis for more customized instruction sessions (see appendixes A–C for exercises and appendix D for instruction learning outcomes standardization matrix). These redesigned sessions took place in a room that previously housed part of the library's art book collection. The room was in a back, almost hidden corner of the library and was rarely occupied. Through informal interviews, it was learned that the few students aware of the space were using it for quiet study. Though this was a valid use of the space, the benefit to the greater student population was weighted more heavily. Also, the room would still be available for quiet study when not being used for library instruction. Library staff assessed the situation and decided the best way to move forward was to remove all the art books and intershelve them with the rest of the collection. This would not only make the books more findable, but the whole of the art collection would then be shelved together. This decision set in motion the shifting and recataloging of hundreds of books, removal of various shelving units, and reconfiguration of tables and chairs. The end result was a space intentionally designed for instruction that could incorporate technology.

Initially, instruction in the new room utilized ten third-generation iPads from a pilot project, which is discussed in more depth later in this chapter. An old mobile SMARTboard 600, and a projector cart with laptop rounded out the new technological components. The pilot project was a success, and shortly after, new bond money became available that was used to upgrade the technology in the instruction room. Twenty fourth-generation iPads were purchased, along with a Bretford PowerSync cart that would streamline device management and transport issues. In addition, the older mobile SMARTboard 600 was replaced with a larger and permanently mounted SMARTboard M600 with ultra-short-throw projector.

The Plan and Implementation

The four goals of the instruction redesign project were (1) to create a standardized curriculum (2) that incorporated technology, thereby (3) providing students with hands-on time in instruction sessions that would be (4) evaluated both formally and informally by students, faculty, and librarians. Funds from General Obligation Bonds would be used to create a dedicated instruction space and purchase the necessary technology.

Developing the Curriculum

When I started as the new reference and instruction librarian in the summer of 2011, I was tasked with reviving the current instruction curriculum and given autonomy in how to do so. This trusting and supportive environment enabled me to be open to any methodology and take chances. My creative perspective on library instruction resulted in sessions that engaged students with content through the use of technology.

All librarians at SFCC had teaching experience, but none of them had formal instruction training. To gain a better understanding of current instructional theory and harvest ideas, presentations, blogs, and articles discussing the creation of engaging library instruction were consulted. These included College & Research Libraries, *College & Research Libraries News*, *ACRLog*, and resources cited and discussed further in this chapter. These resources served as a valuable starting point, but hearing about a project firsthand is often the best way to learn a new skill. With this in mind, in the summer of 2012, I attended LOEX of the West to gain further inspiration on how to rework SFCC library's instruction curriculum.

I attended many sessions during LOEX, but Katherine O'Clair's presentation on her "Amazing Library Race" activity, and Heidi Blackburn's presentation on incorporating pop culture into instruction stood out.[4] The ideas behind these two sessions seemed to be the easiest to implement with SFCC's small staff and limited resources. Sessions that focused on the

incorporation of technology were attended, but the projects presented were too big in scope for SFCC's small staff to take on.

It was the summer semester when I returned from LOEX. Classes were smaller, and it seemed like a good time to take a calculated risk and apply some of the knowledge gained at the conference. A willing faculty member was consulted, and the revised session was scheduled. Blackburn's LOEX presentation on incorporating pop culture was used for inspiration, and one of the new activities was introduced with a reference to the TV show *Parks and Recreation*. There was a recurring bit on the show where two of the characters would declare it a "Treat yo' self" day, where they would have a day full of shopping and spa treatments. "Treat yo' self" sounds very similar to "teach yourself," which is what students would be doing. With this in mind, and the motivation to incorporate pop culture into the session, I generated a meme to introduce the exercise. Only one student in the class of twenty had seen the TV show, so the reference did not resonate with the majority of the class. However, the session was not a complete failure. After reflecting on the experience, I realized the overall session had been a success, and in subsequent sessions, I introduced the exercise without the meme.

The Teach Yo' Self exercise utilized a set of cards developed by library staff (see appendix A for Teach Yo' Self cards). The class was broken into groups of two to five, and each group was assigned a library resource by handing them the corresponding Teach Yo' Self card. The right side of the card had a series of guiding questions the students were to address while demonstrating the resource to the class. The left side of the card was a screenshot of how students would navigate to their assigned resource. Students were given time to work in groups to answer each question and decide who would present to the rest of the class. This resulted in a session where students taught their classmates about the various resources available to them, and the librarian stepped in only when needed. Students were highly motivated to understand the content and were attentive and empathetic when their classmates presented.

There was much talk in the literature at the time of incorporating tablets into instruction as a way to engage students and familiarize them with new technology. A webinar by Barbara Glackin and Amy Vecchione on incorporating mobile technology into instruction helped solidify the idea that standardized instruction would create consistent learning outcomes and enable more staff to help with instruction sessions.[5] These outcomes were based on the ACRL's Information Literacy Competency Standards for Higher Education[6] (see appendix D for Instruction Learning Outcomes Standardization matrix). Glackin and Vecchione's team had created a universal curriculum that ensured all students received the same information and supported librarians not comfortable with teaching by providing a script. Though Boise State University's student population was larger and vastly different from SFCC's, their presentation drove home the idea that librarians needed to take the lead, embrace technology, and share it with our students. The librarians set about seeing how they could implement portions of Boise State University's model on their own campus.

iPads and SMARTboards

With the passing of General Obligation Bonds for libraries in 2008 and 2010, funds became available in July 2009 and July 2011 for libraries to purchase equipment. Discussion among staff began about how best to use the funds. The funding was seen as an opportunity to invest in the library's instruction program, and a portion of the funds were allocated to purchase ten third-generation iPads for a pilot project for instruction sessions.

Logistics were considered, such as where the iPads would be housed, how they would be maintained, and who would be responsible for that maintenance. For the pilot project, I would manage the iPads, allowing me time to formulate best practices. After the pilot, and as demand for instruction sessions increased, the time needed to reset the iPads between sessions became too much for one person to manage. As a result, one best practice put into place was utilizing work-study students to assist with the daily management of the iPads. After each class session, work-study students would wipe fingerprints and dirt off of screens, clear the browser history, and connect the devices to be charged. I was still responsible for software updates and general oversight of the devices.

Initially, iPads were to be stored and charged in a modified locking metal credenza in my office. Once the iPads were received and upon their first recharge, the issue of the tablets heating up in the small unventilated drawer was of concern. Because funds were not immediately available to purchase a solution, the drawer was left ajar, and research on alternatives was started. This search led to the discovery of Bretford's PowerSync cart. The cart could accommodate thirty iPads, would solve the overheating issue, and simplify the syncing and "cleaning" of the devices. The cart would also make transporting the devices to the classroom much easier.

After the purchase of the initial ten third-generation iPads and the successful pilot project, an additional twenty iPads (fourth-generation) were acquired, which increased the library's ability to accommodate library instruction requests outside the library. Since campus computer labs could be reserved months in

advance and fill up quickly, the devices and cart gave librarians the ability to provide the same level of instruction both inside and outside the library, and on short notice.

Library staff researched a number of iPad apps, especially those provided by database providers. However, as most students would be accessing content on a desktop computer, no apps or mobile versions of sites were used. Using the standard version of sites also imitated what the students saw projected during instruction sessions.

Though iPads are fairly intuitive, it was stressed at the beginning of each session that students could sit and watch, if using the iPad became too frustrating. Santa Fe Community College has a diverse student population, with a number of nontraditional students. Some of them found the technology intimidating at first, but the more tech-savvy students helped them through their struggles, and most felt comfortable with the iPads by the end of the session. Users with limited mobility or large fingers also commented that the devices were difficult to use. To increase accessibility, styluses were purchased and left in the iPad charging cart to be offered to all students at the beginning of instruction sessions. The styluses were a nice option to have available, but their use by students was minimal.

Assessment

One of the major goals of the instruction redesign project, and a new element for SFCC library staff, was to formally assess the library instruction program. Library staff decided to achieve this with a combination of self-reflection, a technique learned from reading Char Booth's book, *Reflective Teaching, Effective Learning: Instructional Literacy for Library Educators*,[7] and formal evaluations from faculty. Faculty were chosen as the recipients of the survey due to their seeing students' final projects or papers. An internal survey was designed (see appendix E for faculty survey questions) to elicit feedback at the end of every semester from faculty who had a library instruction session. The goal was to have the survey administered at the end of every semester, but due to staffing changes, it has been administered at the end of only two fall semesters (see appendixes F and G for faculty survey results).

Asking for faculty's feedback let them know the library saw them as partners in the redesign and valued their opinions. Administering a different survey with students was discussed at the time, but it was felt the limited time librarians had in classes was better spent on instruction and that student feedback could be collected informally through class observations. However, some sessions included an assessment of students' learning outcomes by incorporating a variation of Blackburn's "Amazing Library Race" exercise (see appendix B for the Great Library Race exercise).

In this exercise, the class was broken into teams of two to five who raced each other through two to three rounds of questions. It was explained that it was indeed a race, but that accuracy of answers was just as important as speed. The game started with each team being given an envelope with slips of paper on which were the same questions. Once all team members completed their slips, they were returned to the envelope and presented to the librarian for evaluation. This allowed the librarian to assess if students were learning the content and it provided the opportunity to adjust the number of rounds if the whole class was struggling. Each team member had to correctly answer all the questions for the team to move onto the next round. If even one incorrect answer was submitted, the whole team's envelope was returned so the answer could be corrected. Only rounds one and two were used with remedial classes, but the third round was added for all other classes.

Conclusions

There were many observations from this reflective and iterative process, but some of the most memorable were students' reactions when they saw the iPads and SMARTboard. There was one student who remarked, "Sick!" upon walking into the newly finished instruction room. The students' excitement about the technology translated into engagement with the content in a way not possible without the iPads and SMARTboard. Laura Smith, SFCC library technician, commented via e-mail that "Using the iPads for instruction definitely has its pros and cons . . . but on the whole I think they're great—they make group work much more practical than a wired computer lab would, and getting to use 'the big board' makes it easier to get students to present to their classmates. The professors love them, too; I think it lends us some cachet and maybe gets us more respect from those teachers who think technology is the be-all-and-end-all of learning."

Librarians at SFCC believe the instruction redesign project, and the incorporation of technology, was a success, and faculty agree. Over 80 percent of those responding to the end-of-semester survey strongly agreed with the statement, "The equipment used in class fulfilled my students' needs," and over 70 percent strongly agreed with the statement, "After the instruction session, I received positive feedback from my students about the session." One faculty member shared, "The best thing I have done for my students is schedule this session in the beginning of each semester. Thank you." By providing students the opportunity to engage with technology, librarians enabled

them to take ownership of their own learning, while increasing their digital and information literacy skills.

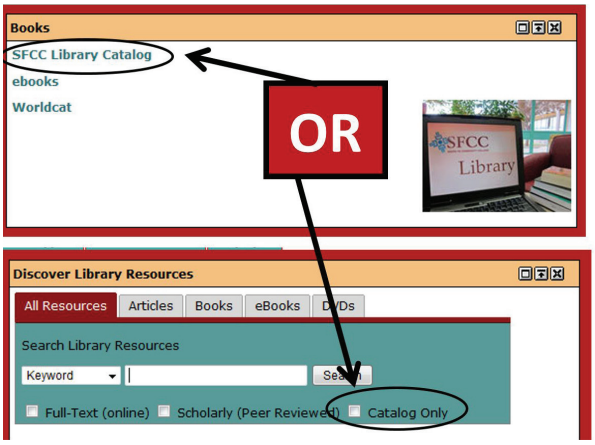
Notes

1. New Mexico Higher Education Department, *Annual Report*, 2013, 43, www.hed.state.nm.us/uploads/files/Data%20Research/Data%20Reports/Annual%20Report%202013%20Final.pdf.
2. New Mexico State Library, *LSTA Five Year Plan 2013–2017*, 2012, 2, www.imls.gov/assets/1/AssetManager/NMplan2012.pdf.
3. Santa Fe Community College, "Student Credit Hours by Discipline," January 2012, www.sfcc.edu/files/opie/StudentCreditHourByDiscipine01-12.pdf.
4. Katherine O'Clair, "The Amazing Library Race" (paper presented at biennial meeting of LOEX of the West, Burbank, CA, June 8, 2012); Heidi Blackburn, "Et Tu, Bart? Information Literacy with the Simpsons" (paper presented at biennial meeting of LOEX of the West, Burbank, CA, June 7, 2012).
5. Barbara Glackin and Amy Vecchione, "Library Instruction Using Mobile Devices" (webinar, Mobile Learning Initiative National Webinar Series/Boise State University, February 2013), http://works.bepress.com/amy_vecchione/45.
6. Association of College and Research Libraries, *Information Literacy Competency Standards for Higher Education* (Chicago: ALA, 2000), www.ala.org/acrl/sites/ala.org.acrl/files/content/standards/standards.pdf.
7. Char Booth, *Reflective Teaching, Effective Learning: Instructional Literacy for Library Educators* (Chicago: American Library Association, 2011).

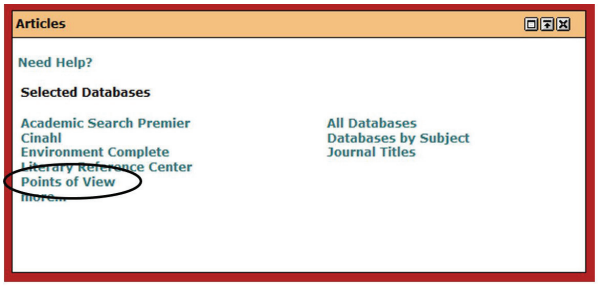
About the Author

Deana Brown is an assistant professor and librarian in the Web and Emerging Technologies unit at Boise State University. She was previously the reference and instruction librarian at Santa Fe Community College, where she undertook the redesign of its instruction program. Currently, she liaises with the philosophy and sociology departments and is active in working groups investigating user experience, space needs, 3-D printing and other emerging technologies. She provides reference services for the general campus population, her liaison areas, and emerging technology users. She also teaches the university's one-credit library research course (ACAD 106), emerging technology workshops, and one-shot instruction sessions for University Foundations courses.

Appendix A. Teach Yo' Self Cards

Library Catalog	***What to know:***
	• Where do you find the call number for a book? What other information do you need to find the item? • How can you tell if the item is available to check out? • Where can you find reserve items for a class?

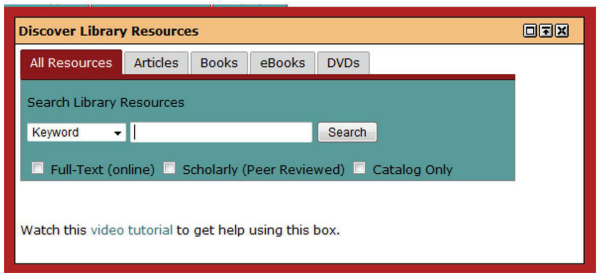
Points of View



What to know:

- Try a search. The first results you get are usually a combination of "Point, Counterpoint, and Overview" articles. What is the purpose of these?
- What kinds of media are available in this database (journal articles, news articles, images, etc.)?
- Show how to read through the full text of an article.
- Is there a built-in citation tool?

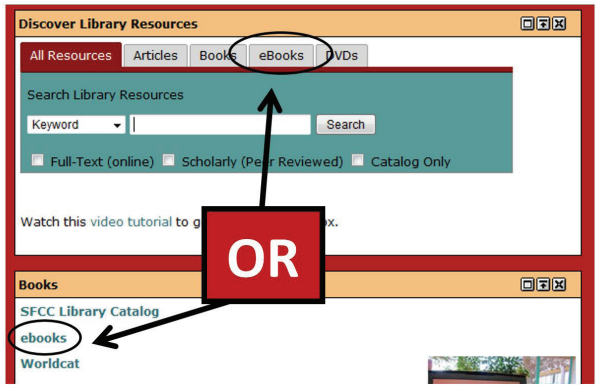
Discovery Search Box



What to know:

- How are "Discovery Tool" results different from what you'll find in the "Library Catalog"?
- Try a search. Show two ways you can make your results list shorter.
- Your teacher tells you to use academic journal articles for your paper. How can you search for articles?
- Look through your results. Can you tell the difference between news articles and academic journal articles?

eBooks



What to know:

- Show two different ways you can search for ebooks, starting from JACK.
- Try a search. Show how you can read the full text of an ebook.
- Show two ways to search within an ebook.
- Is there a built-in citation tool?

Credo Reference

What to know:

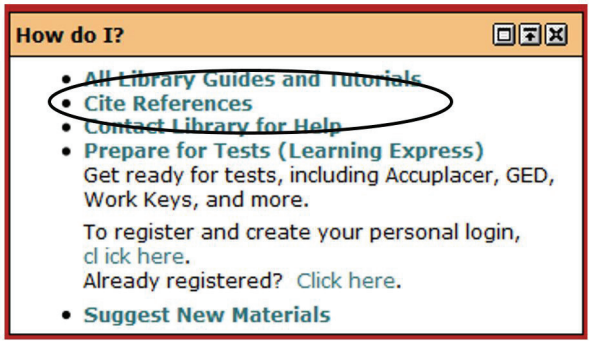
- Show two different ways to search through the encyclopedia articles in this database.
- Show two ways you can make your results list shorter.
- Try the "mind map." When would this be useful?
- Is there a built-in citation tool?

Films on Demand

What to know:

- Show two different ways you can find videos in this database.
- Show two ways you can make your results list shorter.
- How would you send just one chapter of a documentary to your classmate?
- Is there a built-in citation tool?

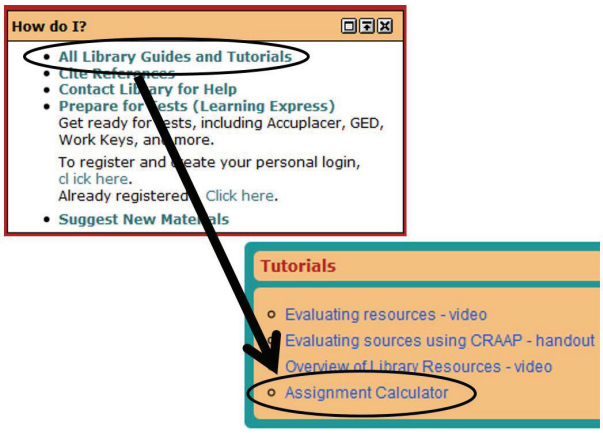
SFCC LibGuides



What to know:

- Show where you can find the steps in the research process.
- Show where MLA and APA citation guides are.
- Does the library have any LibGuides for specific subjects or classes?
- Is there a way to see the newest titles in the library?

Assignment Calculator



What to know:

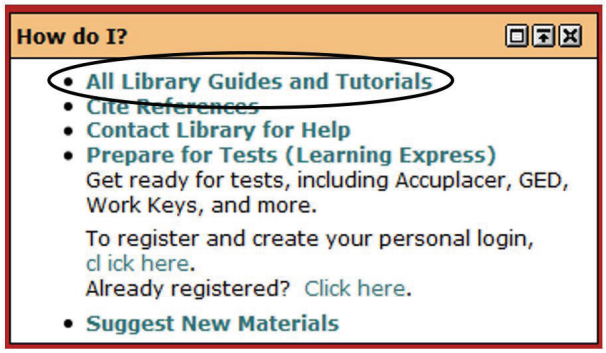
- How does it work?
- Is there a print-friendly version of the timeline? Show us.
- Click on one of the links in the timeline.

Databases/Journals

What to know:

- Look at the list of databases by subject. What would be a good database to use for this class?
- Find a general database, useful for most subjects.
- Find a database that contains images.
- Your teacher tells you an article is available in the database "JStor." How would you go straight there?

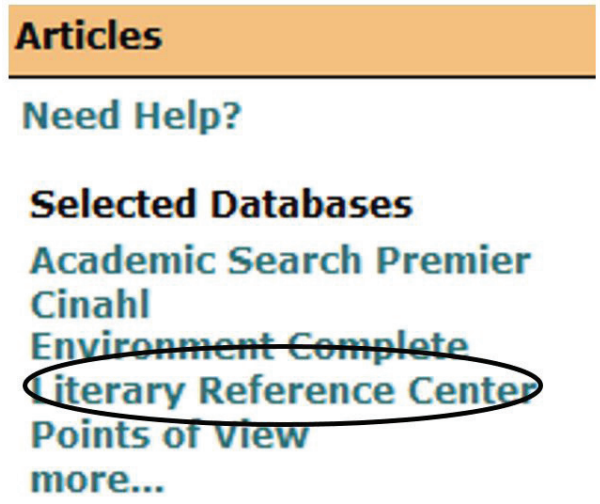
LibGuide: Plagiarism



What to know:

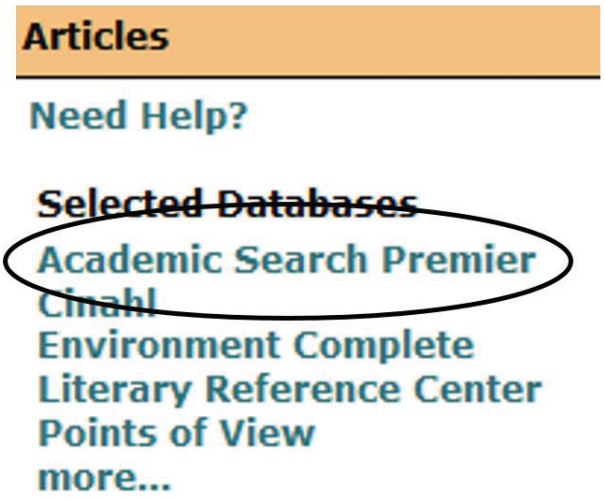
- What is plagiarism?
- What are two ways to avoid plagiarism?
- Which of the following should be cited?
  - Statistics
  - Your opinion
  - Common knowledge
  - A quote from a scholarly resource

Literary Reference Center



What to know:

- Try a search in this database. How many results did you get?
- Show two ways to shorten your results list.
- How do you limit the results to peer-reviewed articles? (We'll talk about this in class, don't worry.)
- Is there a built-in citation tool?

Academic Search Premier	*What to know:*
	• Try a search in this database. How many results did you get? • How can you make your results list more specific? • How can you make your search more broad? • How do you limit the results to peer-reviewed articles? (We'll talk about all this in class, don't worry.) • Is there a built-in citation tool?

Appendix B. The Great Library Race Exercise

Round #1

Your name:

_____

Team's name:

_____

ABOUT THE LIBRARY

1. What are the library's hours today?
   _____
2. Who is the Circulation Librarian?
   _____
3. What is the library's policy on how long students can borrow books from the general collections?
   _____
4. What is the first item on reserve in the SFCC catalog for the class "SFCC LIB 101"?
   _____

Round #2

Your name:

_____

Team's name:

_____

BOOKS AND ARTICLES

1. What is the call number for the book, *The Four Agreements: a practical guide to personal freedom*?
   _____
2. List two databases you could use to find articles for a social science class.
   _____
3. What format(s) is the title, *A River Runs Through It* available in? How do you know?
   _____

Round #3

Your name:

_____

Team's name:

_____

CITATIONS

1. Circle the journal title in the following citation formatted in MLA style.

   Kozak, Metin. "Introducing Destination Benchmarking: A Conceptual Approach." *Journal of Hospitality & Tourism Research* 28.2 (2004): 281-97. Print.

2. The following citation is in APA format; is it for a book or an article? How can you tell?

   Helfer, M. E., Kempe, R. S., & Krugman, R. D. (1997). *The battered child* (5th ed.). Chicago, IL: University of Chicago Press.

   _____

3. The following citation is in MLA format; is it for a book or an article? How can you tell?

   Lipper, Tamara, and Michael Hirsh. "Stepping into the Fray." *Newsweek* 16 June 2003: 26-29. Print.

   _____

Appendix C. CRAAP Exercise

Go to this website:
- www.vegsource.com/harris/b_cancer.htm
- or Google: William Harris M.D. Breast Cancer Statistics

Evaluate this website for: Currency
- Do you see a date when this info was published or posted? Are the author's sources dated?
- Has the info been revised recently?
- Do you see any other red flags that make you doubt this website?
- When might it be a good idea to look at older sources, in print or online?

Go to this website:
- TIME for kids
- www.timeforkids.com

Evaluate this website for: Relevance
- Would this information be helpful in a research paper? Why or why not?
- Does the information add something to your research the other sources don't?
- Is the research at an appropriate level (not too childish, not too difficult)?
- When might it be appropriate to use this website for research?

Go to this website:
- Save the Endangered Pacific Northwest Tree Octopus from Extinction!
- http://zapatopi.net/treeoctopus/

Evaluate this website for: Accuracy, Authority

- Where does the information come from? Did the author cite their sources?
- Who is the author? What else have they written?
- Can you find the same information somewhere else?
- Is there anything over-the-top or exaggerated about this website?

Go to this website:

- Martinlutherking.org
- www.martinlutherking.org

Evaluate this website for: Purpose

- Is the information on this site actually relevant to Dr. King?
- Click on links. Who created this site and why?
- Is there evidence of bias or propaganda?
- What is a paper topic for which you might use this website as an example?

Appendix D. Instruction Learning Outcomes Standardization

This was a working draft used during the time period discussed in this chapter. It has since been updated by current staff, and can be found at http://libraryhelp.sfcc.edu/services/instruction_request.

Instruction Standardization—Course

Course	Resources Covered/ Topics	Learning Outcomes	Class Exercises/ Assessment
READ 100—Reading Fluency/Vocabulary Reading comprehension, study skills, using a dictionary to increase vocab	• Library tour (if requested) • ABE books • Catalog basics • Intro to databases (Points of View, Films on Demand, Credo Reference) • Assignment calculator • Films on Demand • Where to find magazines and newspapers in library	• Know how to use library catalog to locate items in library • Know where different material types are located	• Amazing Library Race (rather than 3rd part, if time, have someone from team retrieve *A River Runs through It* from the shelf, DVD OR Book) • Intro to library resources video
ENGL 109—English Review Basic grammar review, research/writing basics	• Tour of library (if requested) • ABE books • Catalog basics • Intro to databases (Points of View, Credo Reference) • Other resources—Films on Demand • Citation Machine • Assignment Calculator • Mention ebrary (fully cover in ENGL 111)	• Able to do a basic search in Points of View and Credo Reference • Aware of need to cite sources and tools to do so	• Amazing Library Race (rather than 3rd part, have someone from team retrieve *A River Runs through It* from the shelf, DVD OR Book) • Search strategy sheet • "Teach Yo' Self" cards

Instruction Standardization—Course (continued)

Course	Resources Covered/ Topics	Learning Outcomes	Class Exercises/ Assessment
ENGL 111—Composition and Rhetoric College-level reading/ writing, critical thinking, degree seeking	• Tour of library (if requested) • Discovery box and tools • Ebrary • Films on Demand • Citation Machine • Catalog basics • Points of View • Show databases by subject page	• Determine the type and extent of information needed based on the class assignment and be able to extrapolate that need for personal or work needs • Identify, use, and search appropriate library resources, both physical and electronic, to support their information needs • Evaluate information based on currency, relevance, authority, accuracy, and purpose • Understand and differentiate between popular and scholarly resources • Understand plagiarism and how to avoid it by properly citing resources	• CRAAP—resource/website evaluation • "Teach Yo' Self"

Instruction Standardization—Topic

Instruction Topic	Resources/ Topics Covered	Learning Outcomes	Class Exercises/ Assessment
Library Resources How to use the catalog and Jack tab	• Discovery box and tools • Ebrary • Films on Demand • Citation Machine • Catalog basics • Points of View • Show databases by subject page • Assignment Calculator • LibGuides	• Identify, use, and search appropriate library resources, both physical and electronic, to support their information needs	• "Teach Yo' Self" • *Alternately*, "The Great Library Race"
Library Tour	• Basic circulation rules • Where different materials are • Computer use • Study rooms • Student workers vs. librarians	• Determine the type and extent of information needed based on the class assignment and be able to extrapolate that need for personal or work needs	• Scavenger hunt w/iPads (need to create) • Alternately, "The Great Library Race"
Evaluating Web/Print Sources	• CRAAP method	• Evaluate information based on currency, relevance, authority, accuracy, and purpose	• Evaluate fake websites with CRAAP and present to class for discussion
Citation Tools	• Built-in tools • Citation Machine • MS Word (just mention)	• Understand plagiarism and how to avoid it by properly citing resources	• Cover during "Teach Yo' Self" exercise
Plagiarism	• What it is • Paraphrasing • Common knowledge • Intro to MLA/APA	• Understand plagiarism and how to avoid it by properly citing resources	• Online tutorial w/clickers
Importance of Source Type	• Primary vs secondary • Why publication/material type matters • Cycle of publication	• Understand and differentiate between popular and scholarly resources	• Watch video

Appendix E. Faculty Survey Questions

1. Scheduling an instruction session with the library was easy.
   Strongly Agree Agree Somewhat Agree Somewhat Disagree Disagree Strongly Disagree

2. The library was able to accommodate the dates/times I requested.
   Strongly Agree Agree Somewhat Agree Somewhat Disagree Disagree Strongly Disagree

3. The equipment used in class fulfilled my students' needs.
   Strongly Agree Agree Somewhat Agree Somewhat Disagree Disagree Strongly Disagree

4. The librarian kept my students engaged during the presentation.
   Strongly Agree Agree Somewhat Agree Somewhat Disagree Disagree Strongly Disagree

5. After the instruction session, I received positive feedback from my students about the presentation.
   Strongly Agree Agree Somewhat Agree Somewhat Disagree Disagree Strongly Disagree

6. After the instruction session, I saw an increase in the usage of library resources in students' papers/presentations.
   Strongly Agree Agree Somewhat Agree Somewhat Disagree Disagree Strongly Disagree

7. Please provide any anecdotal evidence/comments/suggestions you have for the library about their instruction sessions.

Appendix F. Faculty Survey Results, Fall 2011

Instruction Session Follow-up Survey, Fall 2011

A survey was sent to all twenty-six instructors who brought their classes in for sessions during the fall of 2011. Eleven of those twenty-six responded to the survey. Below are the survey's results.

1. Scheduling an instruction session with the library was easy.
   63.6% Strongly Agree
   18.2% Agree
   18.2% Somewhat Agree

2. The library was able to accommodate the dates/times I requested.
   90.9% Strongly Agree
   9.1% Somewhat Agree

3. The equipment used in class fulfilled my students' needs.
   81.8% Strongly Agree
   18.2% Somewhat Agree

4. The librarian kept my students engaged during the presentation.
   90.9% Strongly Agree
   9.1% Somewhat Agree

5. After the instruction session, I received positive feedback from my students about the presentation.
   72.7% Strongly Agree
   9.1% Agree
   18.2% Somewhat Agree

6. After the instruction session, I saw an increase in the usage of library resources in students' papers/presentations.
   36.4% Strongly Agree
   9.1% Agree
   54.5% Somewhat Agree

7. Please provide any anecdotal evidence/comments/suggestions you have for the library about their instruction sessions.

   This was an excellent introduction to library resources for one of my Critical Reading classes.

   [Instruction librarian] rocks! She goes the extra mile for both students and teachers. We're fortunate to have her.

   I was very impressed and pleased with my class's session.

   [Instruction librarian] was fabulous!

   I think that all beginning reading/writing classes should automatically include a tour with a librarian. My students all greatly benefited from the tours as have I. One glitch, I was not successful in requesting tours through JACK (the college's LMS). I needed to follow up in person to make sure that the request was received.

   Many of my students were unaware of the tools available to them through our library services. I am very satisfied with the ability that I had as an instructor to have a librarian come to show them just what was available to them. Thank You!

   Be sure to present slowly. Lots of info in a short time. Excellent overall. Add some hands-on practice time with students.

Appendix G. Faculty Survey Results, Fall 2012

Instruction Session Follow-up Survey, Fall 2012

A survey was sent to all twenty-eight instructors who brought their classes in for sessions during the fall of 2012. Twelve of those twenty-eight started the survey, and only nine completed it. Below are the survey's results.

1. Scheduling an instruction session with the library was easy.
   91.7% Strongly Agree
   8.3% Agree

2. The library was able to accommodate the dates/times I requested.
   91.7% Strongly Agree
   8.3% Agree

3. The equipment used in class fulfilled my students' needs.
   83.3% Strongly Agree
   16.7% Somewhat Agree

4. The librarian kept my students engaged during the presentation.
   100% Strongly Agree

5. After the instruction session, I received positive feedback from my students about the presentation.
   66.7% Strongly Agree
   8.3% Agree
   25% Somewhat Agree

6. After the instruction session, I saw an increase in the usage of library resources in students' papers/presentations.
   50% Strongly Agree
   33.3% Agree
   16.7% Somewhat Agree

7. Please provide any anecdotal evidence/comments/suggestions you have for the library about their instruction sessions.

The library demonstration has two great advantages it exposes students to amazing wealth of resources our library provides but it also makes research and writing more approachable for younger students and those less comfortable writing.

The answers to these questions really vary across students. Most students got a great deal from the session, while a few didn't. I think this reflects far more on the students than on the presentation. Overall, I think that getting students into the library itself and using the library resources on JACK (the college's LMS) is hugely beneficial.

The sessions were just right for my students' needs. Thanks!

Excellent in all regards.

The best thing I have done for my students is schedule this session in the beginning of each semester. Thank you.

The instructional session with [Instruction librarian] was great. She is an incredible presenter and really engaged the students. It is such an important and great tool to have and offer our students. I appreciate the library enormously and cannot say enough about how competent and willing the entire staff has always been. As far as usage of the library it is difficult for me to get a sense of whether or not the students were actually using the online capabilities. I did put books on reserve and received information regarding the use of those which was disappointing. This is not the fault of the library; it is the culture in general. How we go about changing that I cannot say but I am willing and available to brainstorm at any time if it would be helpful.

The students to a person in both of my 111 classes expressed that the session increased their understanding of the available resources, even those who had attended a previous session for a reading class or for a 109/108 class. . . . thank you.

These sessions are always so useful and students feel so much more confident using resources. The staff explain everything very clearly and answer questions. Thank you!

Chapter 5

Building a Mobile Device Testing and Development Lab @ the UNT Libraries

William Hicks

Introduction

In the fall of 2013, the User Interfaces Unit of the University of North Texas (UNT) Libraries was awarded funding from the Texas State Library and Archival Commission (TSLAC) with a primary goal to "ensure that Texas libraries had a mobile presence useful to, and used by, their customers."[1] TSLAC identified the purchase, subscription, or updating of mobile websites and library catalogs as potential projects and noted a number of vendors and third parties that could provide these services to institutions with limited resources. As with other university libraries, UNT Libraries has a development team managing our website, catalog, and digital collections, and we felt that we would be capable of crafting solutions that met these goals in-house and that this funding could be used creatively for both internal development and patron enrichment. What we lacked, as do many others, was a robust testing framework for mobile design and development.

Testing web interfaces has always been a constantly moving but imperative target, but more so in recent years as its focus has expanded beyond the desktop to a mobile context where the problems of scale become readily apparent. At least as far back as 2010, developers had noted that "it's impossible to test your designs on every mobile phone out there. . . . Mobile devices are expensive, and not every web developer can afford to buy five to ten of them. Testing 'on all mobile phones' is impossible for most web developers."[2] The same article goes on to outline the browser and device landscape of the day and to posit a strategy that, five years later, remains sound. Today, many developers subscribe to a hosted service that takes "snapshots" of, or virtualizes, mobile devices, uses browser-based web developer tools to emulate the mobile experience, and uses tablets, smartphones, and other related hardware as actual testing and development devices. Even Google recommends this practice as part of its own Web Fundamentals guidelines.[3]

In this chapter I hope to demonstrate that both our institutional developers and the patrons we support who are (or aspire to be) developers need access to devices and hardware to build new systems and services. While desktop-based tools are essential for rapid software development, certain aspects of mobile design and development can be accounted for only by touching a physical surface or being in a physical space in the real world. This chapter discusses the development of a mobile device lab, a set of tools that provides the library and its patrons physical access to an array of devices that might otherwise be impossible to access. We will cover the rationale for setting up a lab, some of its possible configurations and integrations with other services like library makerspaces, and finally note some of the issues we faced in setting up a lab in the UNT Libraries.

Why a Mobile Device Lab?

Many institutions believe that the population they serve increasingly accesses web content from mobile devices—primarily phones and tablets. A 2013 survey of "Web 2.0" adoption among 100 US academic libraries found that 76 percent of the libraries had some type of mobile presence.[4] And while many early adopters build dedicated apps or mobile sites, the clear growing trend both in wider developer circles and in libraries is the adoption of responsive design techniques.[5] But most important for this study, having access to a representative sample of the devices that

users employ in the real world affords the library and its developers freedom to consider mobile usability, design, and performance that one simply cannot get while sitting at a desk or relying on a vendor's word. Real-life experiences such as walking through book stacks and looking for a call number can be quite different when you have a pile of books in one arm and a slip of paper and a smartphone, "phablet," or tablet in the other. Thus, when devices are available to library developers, the developers are able to empathize with the lived experiences of the user who might be looking for a branch's hours while running out the door, fumbling with complicated search options, or cursing the rendering speed of the page. None of this is particularly easy to emulate while sitting at a workstation with a high-speed connection and a widescreen monitor.

But looking beyond the library's own needs, as the definition of what a library makes available to the public expands into emerging areas like makerspaces and technology-lending programs, it becomes important to consider how mobile devices and related items fit into this equation for a community's developers, students, and freelancers. When we consider the overall market penetration of mobile devices, we find increasing household use of both smartphones and tablets, with reports showing national adoption rates of the two devices at two-thirds and one-third of the population, respectively.[6] But less clear is the distribution of devices in a household where phones and tablets come from competing manufacturers or have incompatible software ecosystems. And this is of critical importance for any developer with aspirations to penetrate into multiple markets since it is often a personal device that is used for app or website development. If an individual wants to learn how to develop for only a single platform, there may be no problem, but when there is a desire to work in multiple operating systems, across device generations or form factors, or to experiment with new categories of devices, the personal costs become prohibitively expensive rather quickly.

And here, it is important to note that developing for mobile increasingly means thinking about devices and issues other than tablets and smartphones. As we enter into a time where everyday objects are increasingly connected, we need to realize that few individuals or small businesses are able to invest in first-generation products and experimental categories because it is simply too much of a gamble to buy into these platforms. But there are now so many personal data trackers, environmental sensors, remote controlled vehicles, and numerous other "mobile accessories" that are capable of creating and consuming data, or simply letting one learn how to program, that the category is hard to ignore. Most relevant to this study, many of these new classes of devices and services interact with touchscreen devices. Without access to them, many students and low-income individuals have holes in their technical skills as they enter the workforce, and many freelancers lack the tools to allow them to be first-to-market with the next big thing. The same is true of researchers, artists, and other creative individuals—that is, non-programmers—who might find novel uses for these devices but don't have the tools to build or discover when they can't afford to be an "explorer." Libraries, I would submit, are better able than many institutions to level this field and address this very need.

Determining Geographical Need

Having demonstrated the philosophical reasons for providing devices to patrons, it may be helpful to look to other publicly available services for precedence and to judge if there is a need within the community. There is, in fact, a loose-knit group of developers that has created a network of Open Device Labs (ODLs) across the world that seeks to meet this challenge, mostly in western Europe and on the US coasts. Sometimes operating as nonprofits, these labs have grown out of larger tech firms, startups, and a handful of universities, and as of October 2014, according to data obtained through the ODL website's freely available JSON-based API, there are 133 labs in 31 countries, with 25 located in the United States.[7] A more detailed analysis finds that US labs are predominantly located in urban centers and, when correlated to US Census data, it appears that over half are located in areas with populations greater than 250,000, some significantly so (see table 5.1).

Reviewing a sample of ODL websites finds that many labs are open by appointment and that access to their materials are usually reserved through online forms, e-mail, or social media contact. Considering the ubiquity of mobile devices in the consumer market, it seems somewhat surprising then that public access to this type of service is relatively sparse. Libraries around the country, but particularly those in the Central and southern United States, would be well positioned to offer their community's developers access to mobile devices based purely on geography. Similarly, the regularity of open hours common to most public and academic libraries would provide a greater degree of scheduling flexibility for patrons of all types than many existing ODLs offer, even if only a small number of devices are offered.

Getting Started

At the heart of the device lab, whether offered as a public service, internal development resource, or

Table 5.1
Open device lab locations correlated to population estimates (May 2, 2015)

City*	State*	Population (2013)*
Park Ridge	Illinois	37,839
University Park (State College borough)	Pennsylvania	41,757
Burlington	Vermont	42,284
Troy	New York	49,974
Smyrna	Georgia	53,438
Ames	Iowa	61,792
Chattanooga	Tennessee	173,366
Grand Rapids	Michigan	192,294
Madison	Wisconsin	243,344
Fort Wayne	Indiana	256,496
Buffalo	New York	258,959
Cincinnati	Ohio	297,517
Cleveland	Ohio	390,113
Oakland	California	406,253
Portland	Oregon	609,456
Washington, DC	District of Columbia	646,449
Denver	Colorado	649,495
Seattle	Washington	652,405
Charlotte	North Carolina	792,862
Columbus	Ohio	822,553
San Francisco	California	837,442
Los Angeles	California	3,884,307
New York	New York	8,405,837

* Location information from Anselm Hannerman, Andre Jay Meissner, and Christian Schaefer, OpenDeviceLab.com website, accessed October 30, 2014, http://opendevicelab.com; population information from United States Census Bureau website, accessed October 30, 2014, www.census.gov.

both, is the selection of devices and services offered. Looking once more at data provided by the ODL website's API, we find that labs are making over 3,700 devices available from more than sixty manufacturers and that the median number of devices at existing labs is fifteen with only five labs having more than 100 devices.[8]

A survey of ODL websites finds that most labs appear to focus on providing patrons with smartphones and tablets, with some also offering access to Chromebooks, televisions and gaming equipment, e-readers, and other media players. Several note the availability of Google Glass and Oculus Rift, but no information about other related items, such as documentation, prototyping tools, usability-testing resources, or spaces, could be found. At UNT, we were able to acquire twelve smartphones and tablets in addition to several other related electronic devices for several thousand dollars, a tiny fraction of what our parent institution spends on journals, books, and other more traditional items in the collections.

When deciding how to outfit a lab, a number of variables will go into the decision-making and acquisition process, and as we found at UNT, there may be more than a few unexpected issues that pop up along the way. We found that documenting the project in Microsoft Word, Outlook, and Excel was adequate for most of our needs, but suggest tools that allow for brainstorming, something that can account for estimated and real costs, log communications with both vendors and buyers in the organization, and allow regular review of websites that evaluate, compare, or discuss devices and other relevant technology news.

Financing and Accessorizing the Lab

Budgetary considerations will be one of the first and most obvious areas to address, and two specific points outside the initial investment should be considered early on: what continuing investment the institution is willing to make and whether it is worth seeking outside donations to build the collection. UNT's lab was largely built with subsidized funding, with new items purchased using a regular budget line. Our review of individual ODL websites revealed that many appeal to their users for support, crediting those sources online, but outside of a single seed-source for most of their acquisitions, it appears many labs meet with limited

success. As we were setting up the lab, we appealed to library staff, donors, and patrons through several of the library's e-mail newsletters. We thought the advantage of a large community and factors common within libraries—sharing culture, tax-advantage giving, and environmentally or socially aware users—would lead to gifts of older devices collecting dust in a drawer. We ultimately didn't receive a single donation. While the hope is that a more sustained giving campaign in the future might yield better results, realistically, grant-based and internal funding sources will likely fare better.

Once funding sources are in order, purchasing a wide range of devices and accessories can begin. Smartphones and tablets will be readily available from a number of vendors and most can be purchased without data plans, though often at a higher-than-advertised, unsubsidized price. We found that typically the cost of devices was lower for older devices and those that weren't currently in high demand, though this was not always the case. Beyond devices, we purchased books and other documentation related to mobile development; cases for security, travel, and circulation; and power strips for handling multi-device charging; as well as stencil kits, notepads, and drafting equipment that were designed to paper-prototype mobile interfaces. Because we were concurrently setting up a makerspace and felt that there would be some overlap in scope and use, we invested in other equipment such as a Google Glass, Bluetooth-low-energy Beacons, and littleBits electronics to allow patrons access to the Internet of Things and wearable technologies. Other technology items a library might consider will largely depend on its audience, use, and need. Cameras and eye-tracking devices can be acquired to record usability tests of web interfaces and other library services with users, and can be dual purposed at academic libraries serving programs that study human behavior. Similarly, smartphone-controlled "toys" and robotics can be employed as part of the STEM/STEAM programs of the library or its parent institution. It largely comes down to the size and scope of the lab and its targeted audience. As an existing web development unit, we already had access to relevant software and a subscription to a mobile device virtualization service, but an allowance for new software and apps may be necessary for some labs. Finally, when building a public lab, consideration will also need to be given to the time it takes to develop new circulation policies and procedures, particularly as they relate to fees resulting from lost or damaged items and cataloging items appropriately, as well as devoting some attention to a physical space, verifying adequate Wi-Fi coverage, and providing dedicated workstations or laptops and any other items, devices, or services that fit into the scope of the lab.

Selecting Devices

It is imperative to take time to learn which devices are being used by the library's patrons and make purchases that are representative of the audience. The easiest and most cost-effective way to do this is to use tracking software like Google Analytics, which offers various reporting features on devices, screen resolutions, operating system, network, and so on. Because the UNT Libraries operates a number of different websites, including several digital collections with global audiences, we found some variability but found the overwhelming amount of our US mobile traffic originating from Apple and Android devices, with smaller numbers from Windows, Blackberry, Nokia, and others. If a review of website analytics isn't possible, consider consulting wider market trends or survey library users through other means, such as at public service desks or online surveys.

While acquiring popular models of phones and tablets can be a relatively straightforward process, there are a number of factors worth considering that maximize purchasing power and utility. Because many people purchase phones through subsidized carrier plans and upgrade on a multiyear cycle or are locked into a manufacturer's ecosystem of products, it may be worth considering where in the manufacturer's generational cycle a device is before making a purchase. As an example, we found significant traffic from both the Samsung Galaxy S3 and S4 smartphones to our websites and opted to buy the latter device based *in part* on the logic that more people would be upgrading out of the older model. While this approach seems intuitive on its face, we found that it may not always be the right one.

Figure 5.1 demonstrates monthly usage patterns of the two devices on one of our digital collections sites as reported by Google Analytics. While the older model enjoys higher usage throughout its life cycle, there is a visible decline at the beginning of 2014 and eventual rebound. The newer model, by comparison, sees continual growth after its appearance, with a higher peak usage than its predecessor. As of the time of this writing, both phones remain widely available on the market as carrier-subsidized devices and can serve as a model for the considerations one must make when choosing among several devices. We could have easily chosen the older model, saved several hundred dollars, and put the difference toward other devices, but other attributes beyond price and access are worth considering.

One way to think about building a device lab, then, is to attempt to have a diverse collection of items and to avoid homogeneity, at least while the lab is small. In the case of the Galaxy smartphones cited above, both devices have nearly identical size screens and were created by the same manufacturer, but the

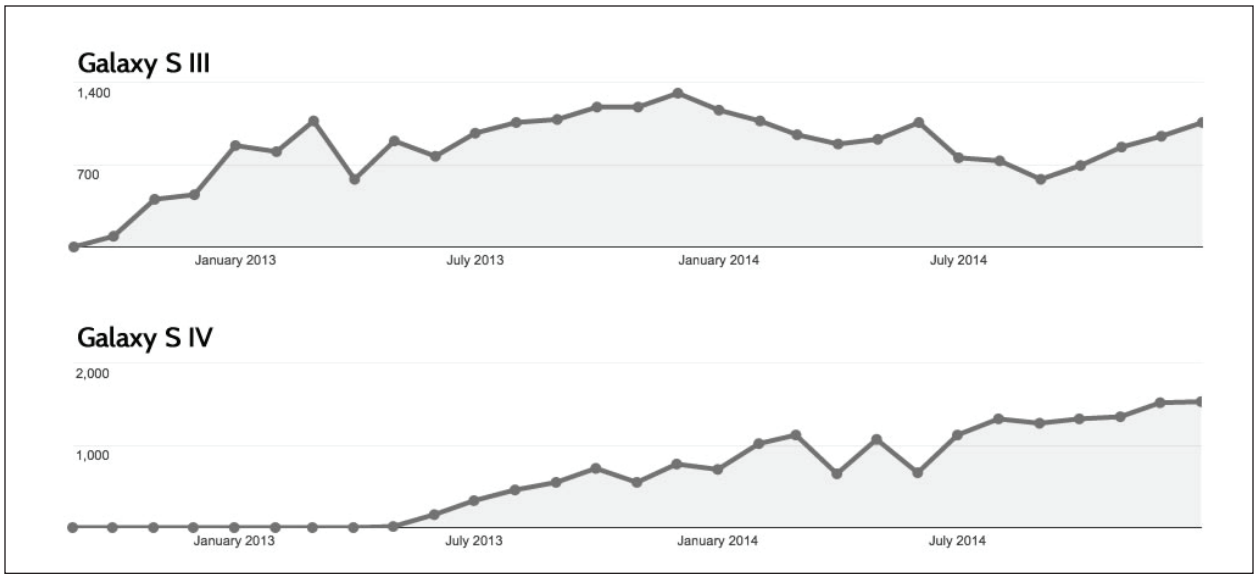


Figure 5.1
Comparison of website visits using a Samsung Galaxy S3 and S4

newer model has a higher pixel density, as well as a handful of other incremental improvements to the hardware. Of significant note, it also has a newer version of Android installed by default, and at the time of our purchase, was available in a Play Edition, meaning it would likely be upgradable to a newer version of stock Android in the future. Thus, we prioritized devices from across a range of screen sizes and a spectrum of operating systems. With regard to the former, our analytics data showed visitors with screen sizes between 320×218 and 2560×1440, so we looked for devices that spanned this general range. With regard to the latter, we purchased devices running the most current version of iOS, Windows, Blackberry, and Firefox OS, but Android was one of the most challenging areas to consider.

Figure 5.2 shows the distribution of Android devices visiting one of our digital collections during a one-year period. Nearly every version of Android has some level of representation on this chart, and thus we attempted to account for this by purchasing devices for most versions of Android going back to version 2.2 (Froyo). As a consequence, we simultaneously covered our other criteria as well since older Android devices tended to have smaller, lower-resolution screens, and most cost less than newer devices.

Unanticipated Events

Because the project of setting up our lab grew out of the User Interfaces Unit, a group not accustomed to making purchasing decisions, developing policies, or circulating materials, several unexpected events caused changes in plans, delayed purchases, and caused or resulted in other unforeseen headaches for us and others. Many of these were related to our own particular institutional policies—often related to technology—and we would expect that other libraries that set up similar labs will encounter problems specific to their own circumstances. We strongly encourage including administrators, purchasing agents, circulation employees, and appropriate technologists into the decision-making process as early as possible so that such problems can be identified and mitigated early.

From an institutional purchasing perspective, building a device lab entails the acquisition of consumer-grade hardware, often from a variety of merchants, and for some organizations this may raise any number of red flags. As an example, our university has a policy concerning the purchase of cellular phones that primarily addresses employees who need a single device for work-related communications. We were buying multiple smartphones, off-contract, and without the intention of using the devices as telecommunications devices, but our purchasing agent still needed to communicate our intentions with university officials and navigate through a number institutional procedures that were unexpected at the time. Similarly, in one instance we sought the purchase of a Windows-based tablet and chose a specific device that we were seeing used in our analytics data. However, a technical reviewer denied the request because the tablet had attributes of a laptop, and the university had a purchasing agreement with a competing manufacturer. While this may seem a minor detail, we would

have saved considerable time had we been aware of existing purchasing agreements for certain classes of physical hardware.

As to software, while the initial setup of our lab didn't require us to outfit our devices with apps, discussions with various agents in our organization quickly told us that purchasing apps or setting up user accounts for the devices would be difficult since it was a gray area within institutional policy, having very little precedent for our type of project. We also found that in several instances, sellers were unable to accommodate our institution's tax-exempt status, or we were met with various problems related to a vendor's online payment system or processing of purchase orders. Finally, we decided not to attempt to purchase used items on the secondary market. While one might expect that this would provide for an economical method to purchase older devices, it proved too difficult in an institutional setting such as ours.

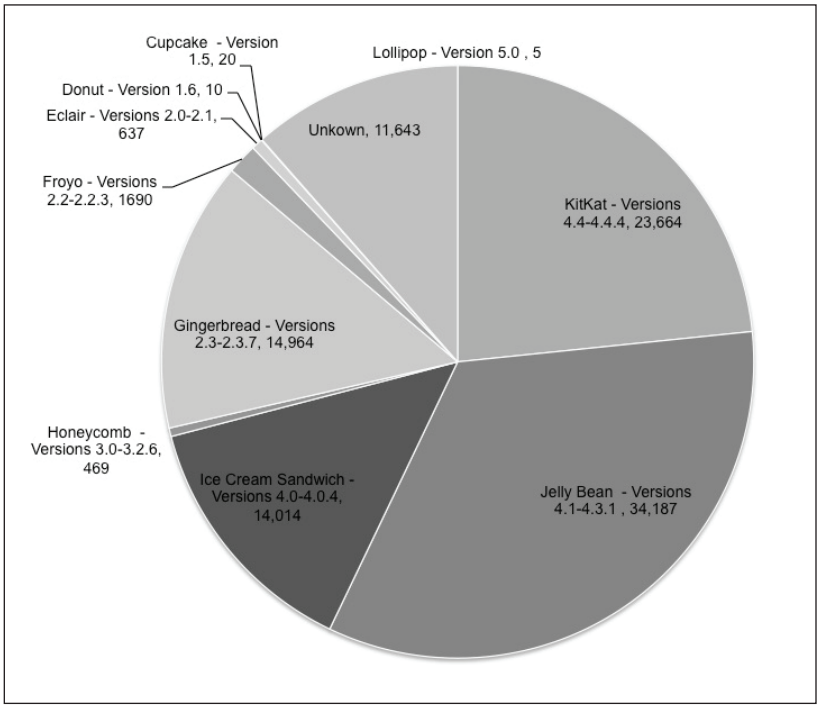


Figure 5.2
UNT Digital Collections sessions by Android version. Oct. 2013–Oct. 2014

Finally, making the tablets and phones in our lab available to the public has been slow to start. Since we took final delivery of our devices at the end of the summer 2014, we immediately began developing a responsive design for our primary and several secondary websites, using the devices for internal development. While we have space available for interested developers to use the items in-house, the unit's offices and work hours are not well suited to allowing patrons unrestricted access, nor have we advertised the device lab in a robust enough way. These are both structural and circumstantial problems that are specific to our institution and the timing of our lab's creation. As stated elsewhere, the ultimate design of a mobile device lab can be quite variable, depending on intended use, audience, and need. Since the UNT Libraries offers a makerspace that lends technology items, we have slowly begun making many items in the lab reservable through that service since (for us) it provides the greatest visibility to patrons seeking access to cutting-edge electronics and development resources.

Conclusion

This chapter has sought to demonstrate that building a collection of mobile devices and related technology for developers within a library is a novel approach to working with touchscreen and other mobile electronic devices. Building such a lab is not without its challenges, but it ultimately brings about a number of positive outcomes for the library. When incorporated into the library's regular stack of development hardware, technical staff have access to the tools needed to build websites and services that simply work for their users. When lab items are provided to the public, patrons with hopes of becoming technically proficient as developers or who want to use mobile technology to make something new can do so without bearing the full financial burden of the tools that make their dreams possible. While having tablets and smartphones available within the library is an important first step, they are a single component within a larger set of tools that libraries should increasingly consider making available to their patrons. In the near future, a well-conceived mobile device lab might consist of a few tablets and a suite of eye-tracking and biometric sensors for institutions with programs in psychology, information science, or business. It could entail a future iteration of smart glasses and health and activity trackers at a library serving a medical school, or a handful of smartphones, 3-D printers, and circuit boards at a college with a strong engineering program. For the school library, it might include tablets paired with littleBits, Mindstorms, a rooftop weather station, and a range of plug-and-play environmental sensors. The list goes on and on. Libraries have historically aggregated books, journals, and other media

to the community, and increasing numbers provide access to photography equipment, calculators, laptops, and other types of nontraditional materials. Mobile-related technology should increasingly be included in the mix.

Notes

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About the Author

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Chapter 6

OCLC on the Responsive Web

Aaron Ganci and John McCullough

Background

Sixty-two. That is the number of widely used mobile or tablet computers on the market as we write this chapter. That number has probably increased in the time it has taken to get to you. The screen on each one of those devices is unique in some way. Some differ in physical dimension. Some have unique aspect ratios. Some have widely different pixel densities. The number of unique devices will become even more extreme in the near future.

Knowing how a digital interface is going to be consumed—at what size, in what setting, with what level of attention, for what purposes, with what input mechanisms—is fundamental to how designers craft good online user experiences. Thanks to the growth and diversification of mobile computing, knowing which contexts your interface will be utilized in is becoming an increasingly difficult task. This has caused a paradigm shift in the way web designers and developers approach their craft. Libraries, of course, inhabit this changing environment.

Like many companies, OCLC has been actively seeking ways to adjust to this new, varied landscape. Our products are frequently the initial web interface for millions of library users around the world. Each of these users accesses our site in a unique way—in either hardware format or usage context. It is important to us that we support as many of the varied devices and situations of our users in the broadest way possible. In redesigning WorldCat Discovery to deliver services into both existing and emerging contexts, we have adopted a responsive web design (RWD) methodology. In this chapter, we outline some challenges we can anticipate in coming years, what advantages we see in RWD instead of other approaches, the impacts RWD has had on our process, and what adjustments we have made to our design and development of our products. To begin, we'll outline the reasons that led us to adopt a new methodology.

Problem Definition

OCLC's discovery products have not, so far, been widely used on mobile devices, although we designed a mobile app for WorldCat.org available beginning in 2009, and the WorldCat Discovery public beta that launched in 2013 has always been fully responsive to reformat the layout for various screen widths. As of the writing of this chapter, around 9 percent of our page views for WorldCat Discovery come from mobile or tablet devices. This is not a large percentage, but when you extrapolate that out to real usage, it's still around 300,000 page views per week. That's a large—and growing—number of people accessing our sites with smaller devices.

But 9 percent of our total usage might not be enough of our audience to encourage a company as large as OCLC to overhaul its product development methodology. Changing how a large team of people works takes solid rationale and a clear benefit for all parties involved. So what data is out there that convinced our teams to update their approach to design and development and adopt a responsive approach? The answer lies in the emerging research trends and forecasts that point to a dramatic shift in the use of post-PC devices. These estimates reveal an overwhelming trend that people are migrating to tablet and mobile computers faster than ever before. For instance, in the United States, 43 percent of the population—age 16 and up—now own a tablet computer or e-reader.[1] Research in the United Kingdom shows a similar user base, with 34 percent of children ages 5–15 now owning a tablet.[2] This statistic is especially important to note because it gives a glimpse of the

future. Children who grow up with tablet and mobile computers will carry those usage patterns into their college years and adulthood. It is clear that the population will be moving steadily away from traditional screen sizes. Future users will not be tied to desktop- or laptop-sized monitors to do their work anymore.

The turbulence of this still-emerging transition to mobile devices introduces a number of challenges for design and development teams. Even several years into their use, there are a lot of unanswered questions and changing answers around how these devices fit into our lives. This reality is especially true in the library. Slow adoption by library staff and patrons still leaves many aspects of mobile and tablet usage a mystery. An adaptive approach that opens up our discovery services to mobile devices in the broadest way possible can help us discover how those services get used in mobile contexts over time by analyzing aggregate use.

Before we can look at how the OCLC teams have updated their workflow, it's sobering to take a look at the inherent complexity OCLC faces when displaying library content in dynamic environments.

Library Content and Multitiered Flexibility

OCLC creates highly dynamic interfaces. This is partly due to the nature of our products. We offer customizable interfaces that are used by thousands of different institutions. Each one of our partner institutions has a unique set of characteristics. At the most visible level, each institution may have its own color palette that can be integrated into the interface. At the most basic level, each institution can choose a mix of functionality available to it based on its usage needs (e.g., information about local availability of library materials, interlibrary loan, full-text access, etc.).

The other factor that plays into the flexibility of OCLC's applications is that we're dealing with library content that is widely variable. The content we utilize either comes in a raw format from the MARC (Machine-Readable Cataloging) record or is dependent on the availability of local holdings. When a user runs a search in WorldCat Discovery, we can't predict how big a search result will be, how many authors an item has, how long the title will be, how long a description is, or whether or not an item has cover art. Each item's set of MARC and availability data shapes our user interface differently. To accommodate this, we have always had to think flexibly about how content might be displayed. Now, with the introduction of varied screen sizes, we are forced to add another level of complexity to our responsiveness. The variable nature of our content, coupled with a diverse hardware landscape, presents a very useful case study in flexible design. We will now describe what measures our teams have taken to work in this environment.

Solution Development

We have developed an integrated solution to help improve our work under such variable requirements. There are three important aspects of our approach that we will outline below: content workshops, a UI (user interface) framework, and adaptable usability and utility testing. In sharing these, we hope that you might be able to glean some recommendations about how to work with similar content in a responsive environment. To begin, we will discuss the importance that content plays when working responsively and outline our process in managing content.

Working Content First

A persistent question when working in responsive environments is "How do you manage content?" When we looked at the situation, we found two approaches that we could leverage. One methodology says you should make very few, if any, changes to the content you display to the user. If content is available to the user in one viewport, it should be important enough to show in any viewport. This is a specific flavor of responsive web design called "mobile-first."[3] The other approach is more open to showing and hiding content at different views. In this approach, the team must determine—or guess—what content users need at various views. For instance, a user who is accessing WorldCat Discovery on a smartphone may be using it only to quickly recall a small detail. In this case, the user would need to see just a small subset of data about the item rather than a full description. This second approach can help with aspects like page load time because you push only the exact content that is needed. This approach doesn't have a formalized name but generally falls into a methodology called "adaptive web design."

We chose to utilize the first approach because our primary goal for WorldCat Discovery was to create as consistent an experience as possible regardless of viewport. Someone using WorldCat Discovery should be able to use it equally well on a smartphone, tablet, desktop, or any other device. This approach is ideal from a development standpoint because it creates much less complexity. This approach also provides a learning opportunity for our teams. By not fragmenting what we show users, we are able to better track how people are accessing our content on various devices. We will track usage patterns over time and integrate trends from these analytics into future designs.

We were confronted with several problems while putting this approach into action. To use this method, we have to assign priority to content: on smaller screens, we can display less content on one screen, and since we are using near-identical content across all views, we need to make sure that important items are still

visible in small viewports. We discovered that assumptions about what content mattered most varied greatly among the various team members (business vs. development vs. design). Different understandings about these priorities were delaying us because many content disagreements had to be resolved independently.

The solution we developed to avoid these disputes came in the form of something we call "content first workshops." In these workshops, members from the business, development, user research, and design teams come together before any new designs begin. By meeting early, in the conceptual phase, all of these team members can bring their preferences and concerns to the table and assign content priority together. These sessions are usually led by a UX (user experience) designer who guides the conversation by first asking everyone to agree on user definitions and primary task flows. Making these factors clear in the beginning helps shape the way the team thinks about the content. It is nearly impossible to assign content priority without users and tasks in mind.

With a common understanding, the team is able to look at the potential content that could live on a page, determine what is essential, and prioritize it accordingly. The goal at the end of the session is to have a content-only wireframe of the page in question. In theory, at the end of this workshop, the team has created a semantic view of the page, or in other words what a user might see if CSS is disabled. Even if the content flows into the page in its raw form, it is still accessible and usable. This semantically pure layout becomes an extremely useful tool for the UX and development teams in actually implementing the page. We have found that taking emphasis away from the visual layout through these workshops is an excellent way to work responsively and make sure the design works at any viewport size. In the next section, we'll discuss a method to visualize the prioritized content.

A Systematized UI Framework

Now that our content is prioritized and universal, we are able to generate one consistent codebase that works regardless of screen sizes. Our next struggle came when we needed to visually style and organize that content. Revising our visual design process, we chose to keep a parallel approach to our content management. However, when presented with the need to generate a design at variable screen dimensions, we discovered important criteria: flexibility and systemization of the visual layer.

When visual designers need to design a page for responsive environments, they tend to think about the interface at various "breakpoints." What will this page look like on a desktop? Tablet? Smartphone? Recently, this has become more difficult due to the uncertainty of how each of those broad labels is actually defined. Ideally, visual designers want to customize their layout or elements on the page at each of these breakpoints because they are considering context of use at each screen size (touch formats need larger buttons, bigger text; desktop formats can have wider text columns; etc.). Because the WorldCat Discovery team adopted a mobile-first methodology for our content, it is now improper for the designer to completely overhaul a page layout for specific screen sizes. Remember, we want the utility of the site to be universal. To support this methodology, the visual design must now appear consistent at each screen size but still adapt for usage needs. These restrictions make it cumbersome to specify how elements should be styled at each screen size. Trying to design each individual page and accommodate for all the responsive variables at play actually becomes untenable.

After much struggle, we finally found a solution in the form of a customized UI framework. UI frameworks are essentially visual style guides that systematize a UI design by defining visual and functional details about page elements (buttons, dialog boxes, navigation, etc.). Some very popular frameworks are publically available (Foundation or Bootstrap), but WorldCat Discovery had specific needs that drove us to create a custom framework. We call it CoreUI.

The creation of CoreUI has allowed OCLC's designers to systematize every aspect of the visual design. This is helpful in a responsive environment because it allows us to simplify how we adjust a UI at various viewports. With CoreUI in place, once we know the size of the screen, we can load predefined elements rather than generating a custom display for every page. For example, in CoreUI, we have several predefined and named button styles (regular, small, expanded). Once we check the screen size through a media query, we simply send the appropriate predefined button style to the page. Instead of guessing what button will work best every time a page is constructed, we define usage details ahead of time. For instance, we know that the "expanded" button (with a width of 100 percent of the screen) works better than a "standard" button at small screen sizes. This workflow allows the designer to systematize what styles will work best at what screen sizes. This process makes developers' jobs easier because they have clear rules for when to use various iterations of elements. Using the CoreUI has streamlined our process and made it easier to produce a visual design that is consistent yet customized for each screen size. Next, we'll talk about methods we are using to inform the future of our content strategy and UI implementation.

Usability and Utility Moving Forward

When building any application, especially one as dynamic as WorldCat Discovery, it is important to

test how usable it is for our users. Usability testing has always been a part of our process at OCLC, but it takes new forms in a responsive environment. Usability test sessions usually revolve around a set of tasks that a user will undertake. We recruit representative users to complete these tasks with our design. If the user struggles, we can identify when and why and then adjust our design accordingly. Our process remains similar but has changed slightly now to test at various screen sizes. We now make sure to test appropriate tasks at various screen sizes (usually some combination of mobile, tablet, and desktop) to note alterations that need to happen at each viewport.

For example, in a recent usability study, we investigated how users prefer to facet or filter their results list. We had several questions about when and where we should display the facets at each screen size. Because so much of the mobile and tablet interfaces are new, we often have to make educated guesses about user expectations and then test our solution. At tablet and smaller screen sizes, we decided to hide the facets by default and require the user to click on a button to reveal them. After testing our initial designs, we found that users rely heavily on facets and trust that they are the fastest way to narrow their search accurately. They missed having the facets immediately available; at the tablet view, none of the users were able to initially locate the hidden facets. This told us that we need to adjust our design to make the facets initially visible whenever possible. Only at the smallest viewports do we hide them, and when they are hidden, we make it as obvious and easy as possible for the user to access them. This is just a small example of the importance of usability testing in our new responsive process.

There are still many more unknowns about what tasks our users want to complete with WorldCat Discovery at various screen sizes. To make our product better moving forward, we need to keep refreshing our understanding of appropriate tasks within the different screens sizes. It is safe to conclude that library users' needs will to continue to evolve as devices and usage becomes even more varied in the coming years. OCLC is in a unique position to inform this area because we have such a large user and diverse user base across the library sector. Our ability to track usage patterns and compare them to screen size will increase our understanding of how and why people might use a library interface on different devices. The responsive interface that is available today is only a first step in considering what utility WorldCat Discovery will need moving forward. Analytics will either confirm that our universal responsive approach is working or that we need to adapt content more specifically within various devices.

Conclusion

Moving to a responsive web environment is a challenge for any company as large as OCLC. Our challenges are amplified by the inherent complexity of library content and the capabilities of WorldCat Discovery. We have taken several steps to adapt our process to create a better online library experience for librarians and patrons around the world. Our use of content-first workshops, the CoreUI framework, and our ongoing usability and utility testing have helped the OCLC team adapt to the new responsive web. The new methodologies we've put into place help ensure that we can create a consistent experience for our users regardless of what device they are using. However, many questions still remain about what impact these devices have on specific usage patterns of library patrons. Being flexible when it comes to the responsive web has served our team well so far. As we continue to venture into the unknown of the library in the post-PC world, remaining flexible will be more important than ever before.

Notes

1. Lee Rainie and Aaron Smith, "Tablet and E-reader Ownership Update," Pew Research Center, October 18, 2013, www.pewinternet.org/2013/10/18/tablet-and-e-reader-ownership-update.
2. Ofcom, *Children and Parents: Media Use and Attitudes Report*, research document (London: Ofcom, October 2014), 5, http://stakeholders.ofcom.org.uk/binaries/research/media-literacy/media-use-attitudes-14/Childrens_2014_Report.pdf.
3. Luke Wroblewski, *Mobile First* (New York: A Book Apart, 2011).

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