

# If You Build It, Will They Care? Tracking Student Receptivity to Emerging Library Technologies

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## **Abstract**

The movement known as “Library 2.0” has fostered extensive technology experimentation among academic librarians. While some experiences developing innovative user services can be transferred between contexts, a one-size-fits-all approach to library technology has at times proven problematic due to demographic and cultural differences among institutions and patron populations. The basis of sound user-focused programming lies in local insight provided by environmental scanning. This paper presents preliminary findings of a comprehensive research project charting student technology adoption and library usage patterns at Ohio University. Results of this project provide significant insight into the emerging library technology receptivity of higher education students, and will continue to inform future directions in reference and public services programming at Ohio University Libraries.

## **Introduction**

Widespread belief in an increasingly digital student base has become a key change agent within academic libraries. A perceived shift in technology use and

information-seeking behavior has catalyzed significant cultural and curricular transformations within academe, yet the basis of such generational arguments continue to be debated among theorists in a number of disciplines. Authors such as Marc Prensky identify a clear break in the abilities, perceptions, and attitudes of “digital natives,” individuals born in the early eighties who have come of age in an environment of ubiquitous connectivity.<sup>1</sup> Others see such generational arguments as overly simplistic, arguing for a closer analysis of the broad effects of technology diffusion within society.<sup>2</sup>

The characterization of incoming student users as web-dependent and impatient with information delay puts them squarely at odds with the cultural perception of libraries as static, analog institutions. The persistent branding of libraries as outdated repositories of print material is often used to explain perceived declines in library use, particularly among younger patrons.<sup>3</sup> In response, new approaches to technology, architecture, education, access, and public services represent broad efforts to continually reinvision academic libraries for a new type of user. Reflective of the ongoing and self-conscious digital transition within

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higher education, libraries and academe in general are pressed to integrate innovations in pedagogy to better accommodate incoming students.<sup>4</sup>

The recent explosion of adaptable communication tools, Web 2.0 applications, and open source software has provided librarians with an increasingly accessible technological landscape. Widespread adoption of user-generated applications has fostered extensive experimentation in user services programming across all sectors of librarianship, and as a result myriad services have been created or recast under the aegis of "Library 2.0." While there are countless examples of successful emerging technology services, some have been met with mixed results or have encountered unanticipated problems.<sup>5</sup> Many librarians are currently in the process of evaluating or troubleshooting their first forays into 2.0 programming, sometimes finding that the dynamic tools once perceived to hold great promise now languish quietly within library websites and social networking utilities. Consequently, some have begun to question what has been characterized as a "twopointopian" approach to emerging library technology.<sup>6</sup>

Although it encourages a user-focused approach to service development, in practice Library 2.0 has often been guided or inspired solely by the experience of peer institutions and/or national survey data showing the increasingly technological inclination of higher education students. This reliance on external information as a service impetus has perpetuated two assumptions that have at times led to the development of underused social and mobile library programs that do not "fit" the context and character for which they were intended. The first is symptomatic of what Michael Stephens describes as "technolust," characterized in part by a belief that inherent library/information potential lies within every new social networking application and mobile communication technology.<sup>7</sup> The second dictates that blanket generational and demographic traits correspond predictably with specific library, information, and technology use and access methods. These assumptions underestimate a critical element of successful technology development, namely, that the local climate of library, information, and technology use at a given institution is paramount in determining the need for and potential success of a given service.

The local context of any campus can be radically different from national norms, and must be investigated in order to determine the actual need for emerging technology library services. Unless contextual insight is

gained, Library 2.0 risks the arbitrary introduction of technology to potentially uninterested or nonexistent user communities, also known as the "creepy treehouse" effect.<sup>8</sup> The process of environmental scanning can supplement benchmarking and national research in order to provide the insight necessary to prioritize and evaluate potential emerging technology service options that are needed and desired by a local user community. This paper presents selected findings and implications of a large-scale student research project undertaken to inform emerging technology development at the Ohio University Libraries. This project, which deployed web-based questionnaire methodology to investigate Ohio University students, revealed needs and characteristics that both confirmed and challenged typical assumptions of library and technology use.

### **Informing Library Technology at Ohio University**

Like countless other institutions, the Ohio University Libraries have adapted social and mobile technologies such as IM/Meebo reference, subject blogs and wikis, an interactive online FAQ database, podcast series and tours, a video reference kiosk, and web calling reference services to create innovative user services. Discouraging results from several of our more experimental pilot programs led us to consider whether our approach to public service innovation privileged technology itself before user needs. This in turn motivated the Reference and Instruction Department's Technology Team to reflect on how to better incorporate user evaluation into the programming development process. Hoping that local insight might mitigate the ambiguity created by pursuing emerging technologies on the basis of conjecture, we developed a student-focused environmental scanning project in order to gain a better understanding of how students interacted with libraries and technology and to identify those library technologies they would find useful in a local context.

What had been a largely informal process of creating and refining tech-based services thus gave way to a comprehensive technology and library use research project intended to reveal actual student technology needs and desires. By compiling data on student perceptions of library services and attitudes towards information and communication tools, we hoped to test our generational and demographic assumptions prior to developing the next phase of tech-based services. In our large-scale examination of student library and technol-

ogy use, a series of two web-based survey instruments were administered to Ohio University students during Winter and Spring Quarters of 2008. More than 3,600 respondents or close to 20% of the student body completed the first questionnaire, while roughly half that completed the second survey. Findings present a detailed and often surprising window into the technology adoption patterns and library perceptions of students at a large North American research university at a time of considerable sociotechnical change.

### Setting and Methodology

Ohio University and its library system are generally representative of medium to large doctoral research institutions in the United States. An ARL member institution, Ohio University consists of seven campuses with a main branch located in Athens, Ohio. The Athens campus has approximately 21,000 students and 1,200 faculty members.<sup>9</sup> Eighty-eight percent of students are undergraduates, 12% are graduate and medical students, and enrollment by gender is roughly equivalent (51% female to 49% male). The Ohio University Libraries employ roughly 100 FTE, hold a collection of close to 3 million volumes, and were among the founding members of the OhioLINK consortium. Participation in the survey was limited to students enrolled at the Athens campus. Data collection consisted of two web-based questionnaires created using the Libraries' online survey management application, phpESP 1.8.2.

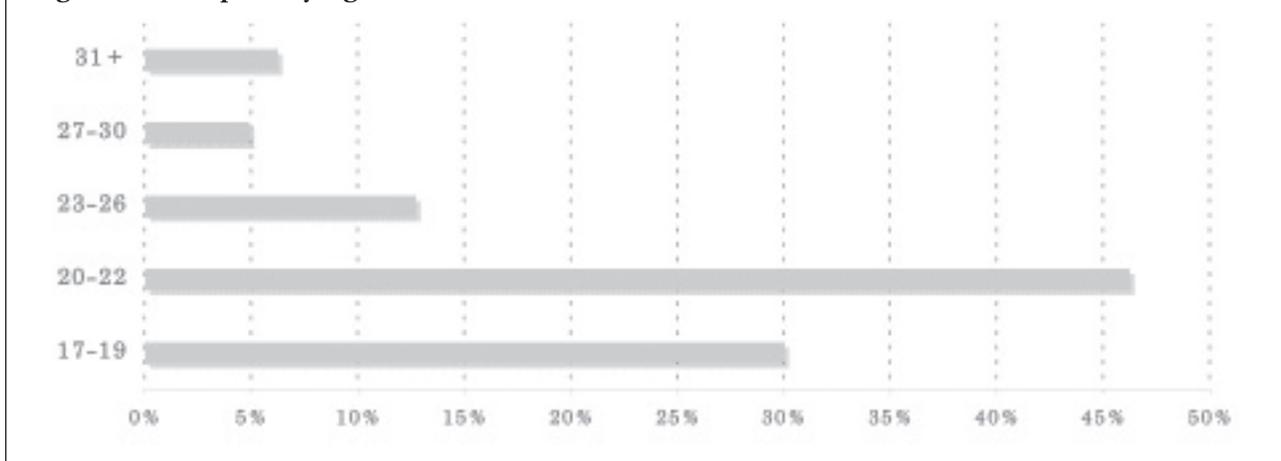
Administered from January 9, 2008, to February 15, 2008, Library Technology Survey 1 consisted of 55 primarily closed-form multiple-choice items covering a broad range of technology and library-related

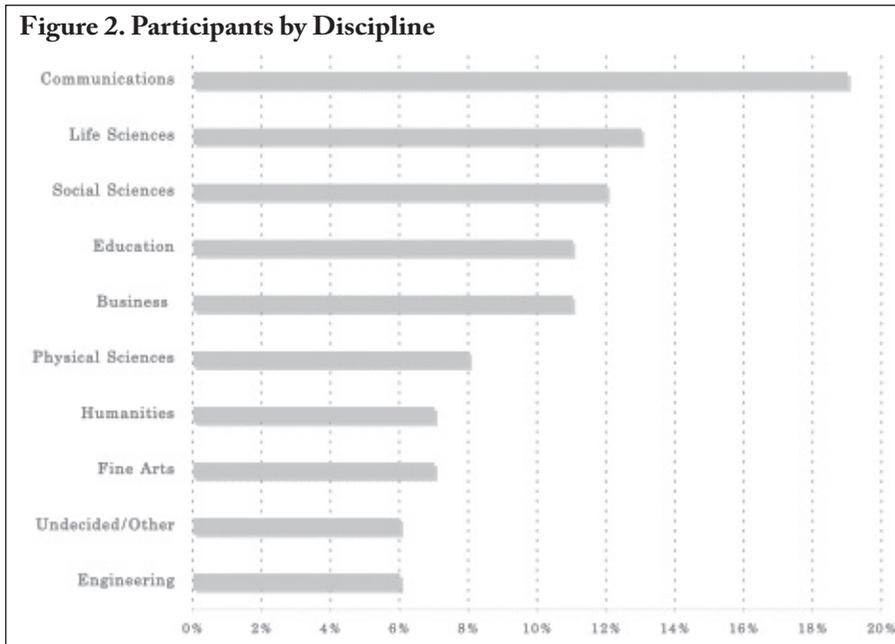
topics such as mobile browsing, virtual collaboration, gaming, browser customization, library integration into campus learning management systems, web calling, and SMS/text messaging. Library Technology Survey 2 was administered from May 15 to June 15, 2008, and consisted of 22 open response and multiple-choice items that covered primarily library service, information, and facility use.

The information, communication, academic, and library technologies surveyed in this project were not intended to be exhaustive. Specific topics were selected for their relative popularity and/or ability to represent classes of similar products (e.g., Meebo for web-based IM) as well as their development potential at the Ohio University Libraries. A number of items were included in both questionnaires as a content validity measure and to enable accurate demographic reporting of sample populations. Because the project was primarily intended to contribute to the development of library services and the identities of participants were kept private, Institutional Review Board (IRB) approval was deemed unnecessary by the Ohio University Office of Research Compliance. In order to ensure their accuracy and reliability within a user needs assessment context, questionnaires were reviewed by Reference and Instruction Department librarians, a College of Education faculty member, and student library employees prior to their release. Minor stylistic and content changes were made based on feedback from each group.

A campus-wide e-mail, a posting in the Library News blog, and a long-term link on the Ohio University Libraries home page promoted the surveys.

**Figure 1. Participants by Age**





tion, 88% (N=4,728) of the sample population can be considered “digital natives” (born during or after 1981) while the remaining 12% (N=571) can be considered “digital immigrants” (born before 1981).

Approximately eighty-one percent of participants were undergraduate students, 16% were graduate or medical students, and 3% were “non-traditional” or non-degree seeking students. Considerably more female respondents participated than male, 61% v. 39%. Respondents reflect a representative cross-section of academic disciplines, with heaviest participation from Communica-

Ninety-three percent of respondents learned about the instrument by e-mail, 5% from the library website, and 2% via word of mouth. Students were offered financial incentives to participate in each survey—three randomly selected students received \$100 at the conclusion of Survey 1, and one received \$100 at the conclusion of Survey 2. While Survey 1 experienced twice the return rate of Survey 2, overall response to each survey far exceeded expectations. A total of 3,648 respondents or roughly 18% of the student population completed the first online questionnaire, while 1,651 or roughly 8% completed the second. It should be noted that respondents in the second survey were slightly older on average and reported marginally higher library use rates than those in the first, likely due to the mid-quarter release of the second survey relative to the early-quarter release of the first.

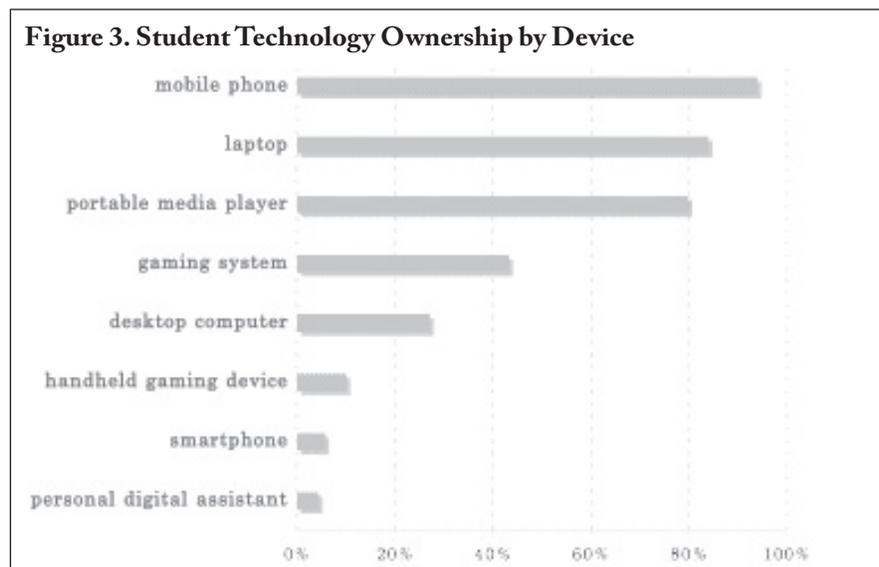
tions, the combined Life/Health Sciences, the Social Sciences, Business, and Education (Figure 2).

**Selected Findings**

The following data represents a limited selection of findings generated by the environmental scanning project in question. Data included provides broad insight into the library and technology cultures of Ohio University students, and is meant to be representative of the types of practical analysis that can emerge from local user research. A more comprehensive treatment of survey findings will be published under separate cover.

**Demographics**

Seventy-six percent of survey respondents were 22 years old or younger, 12% were between 23 and 27, 5% were aged 27 through 30, and the remaining 6% represented the 31 and older student demographic (Figure 1). Using Presnky’s generational demarca-



**TABLE 1**  
**Devices Owned by Digital Status**

	Native	Immigrant
Desktop computer	24%	55%
Laptop	84%	81%
Portable media player	83%	55%
Mobile phone	95%	86%
Smartphone	6%	5%
Personal digital assistant	4%	9%
Gaming system	45%	23%
Handheld gaming device	10%	8%

**Technology Use and Ownership**

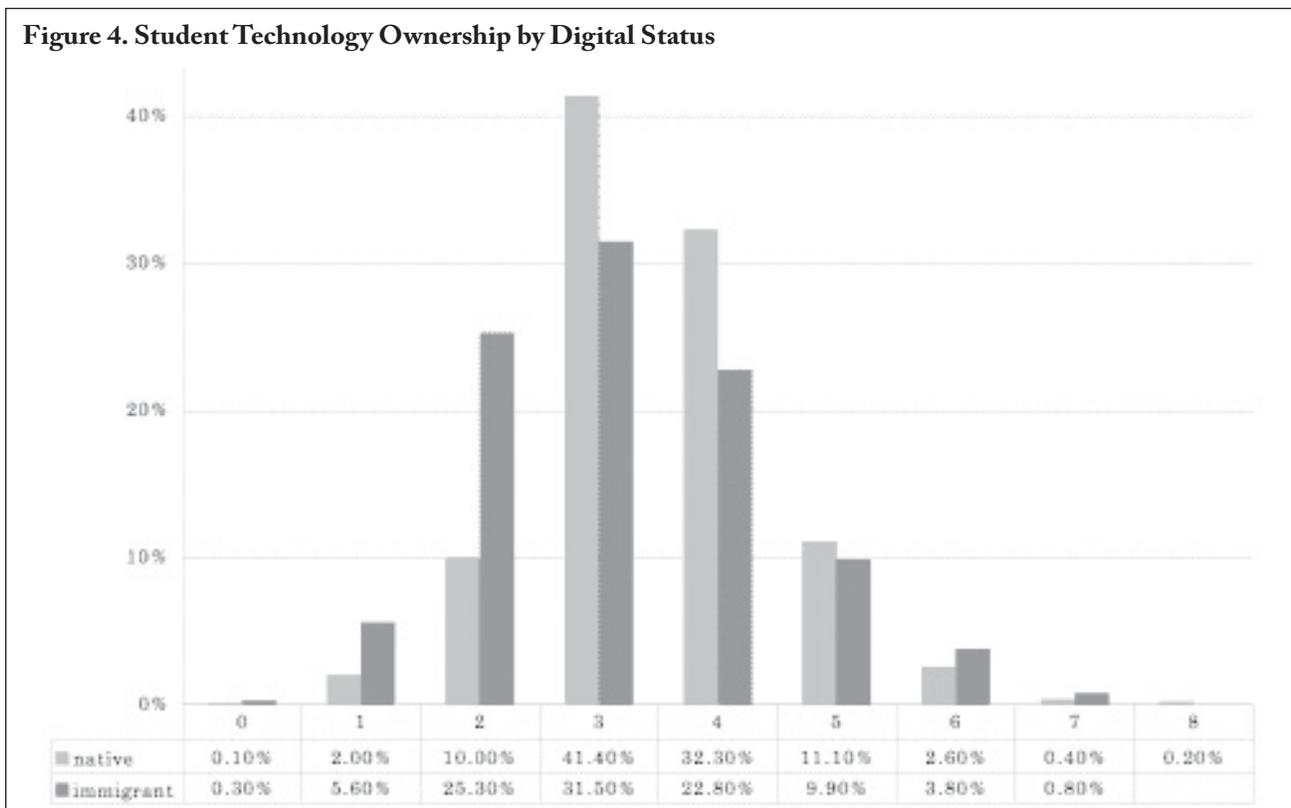
Twenty-seven percent of students reported owning a desktop computer, whereas 84% owned a laptop (Figure 3). Twenty-three percent of respondents were Mac users, while 77% use Windows-based platforms. Roughly 1% use Unix or Linux machines, equivalent to the number unsure what type of operating system they use. Ninety-four percent owned a cell phone, while 80% own an iPod or similar MP3 player. Only 6% reported owning a “smartphone” such as a Blackberry or iPhone, while 4% owned a PDA or similar

device. Of cell phone users, 80% sent text messages. Over 40% students owned a gaming console such as a XBOX or PlayStation, and close to 10% owned a portable gaming device such as a PSP or Nintendo DS.

Ohio University students reflect a trend among higher education students towards increasing ownership of mobile technologies such as laptops, cell phones, and handheld gaming devices, illustrated most clearly over time by the 2004-2008 ECAR *Study of Undergraduate Students and Information Technology* (Table 1).<sup>10</sup>

On average, younger students were likelier to own more mobile communication and computing devices than older students, but that digital immigrants are slightly more likely to own the greatest number of devices (6-8 total). Respondents 26 and younger tended to own 3-5 technology devices, whereas those 27 and older tended to own 2-4 (Figure 4).

Thirty-two percent of respondents spent 11-20 hours using the internet during a typical week, while 21% spent 6-10 and 23% spent 21-30 hours online. Twenty percent of respondents reported spending more than 30 hours online on a weekly basis, with only 5% using the internet less than 5 hours during the same period. Eight percent of



**TABLE 2**  
**Weekly Internet Use by Digital and Academic Status**

	Academic Status		Digital Status	
	Undergraduate	Graduate	Native	Immigrant
Less than 5 hours	4%	4%	5%	5%
6-10	22%	18%	22%	20%
11-20	33%	26%	32%	28%
21-30	23%	21%	23%	20%
31-40	10 %	15%	11%	12%
More than 40	7%	14%	8%	14%

**Social Software and Other Emerging Technologies**

Ninety percent of respondents used social software such as Facebook, MySpace, and/or Flickr. Eighty-six percent of total respondents indicated that they used Facebook, 36% MySpace, 60% YouTube, 5% Flickr, 1% LinkedIn and/or Delicious, and .3% Twitter. Numerous sites such as Orkut, Friendster, and Digg were mentioned by respondents in the ‘other’ category, but not to a statistically significant extent. Whereas use of the other social technologies listed above is consistent between genders, female students were more likely than male students to use Facebook or MySpace by an almost 2:1 ratio. Over 50% of Facebook users have added up to 5 applications to their profiles, while of Facebook and MySpace users combined over 50% posted comments to friends’ profiles at least several times a week. Facebook was almost ubiquitously used by 17-22 year olds, and while its use is inversely proportional to age Facebook is still highly popular among Ohio University students under 30. MySpace was used by roughly

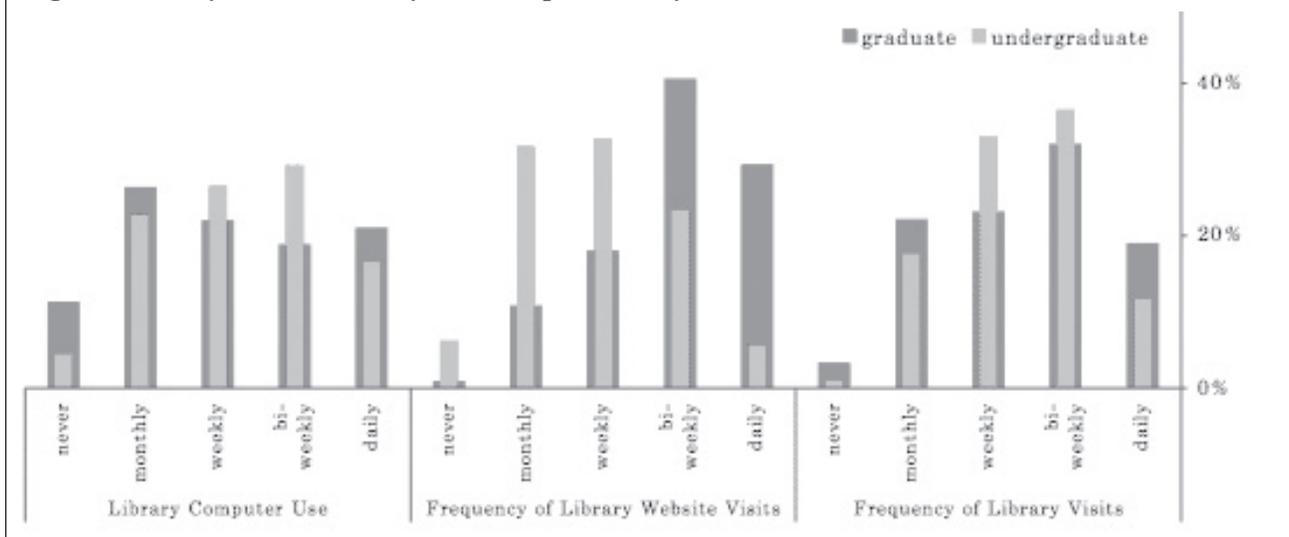
respondents spent more than 40 hours online per week. When compared by age and academic status, the division in internet use between graduates and undergraduates closely resembles the difference between digital natives and immigrants. Contrary to assumptions that digital natives spend more time online, higher age and academic status are both closely correlated with increased time spent engaged with the internet.

Table 2 illustrates that the greatest differences among respondents of disparate digital and academic status is visible at the highest levels of internet engagement. Ohio University graduate students and digital immigrants were twice as likely to spend over 40 hours per week online as undergraduates or digital natives, who are more likely to spend 21-30 hours online per week. Four to five percent of each demographic consistently spends less than 5 hours online per week, while in general the lower ranges of internet use are much more consistent between groups. That students 31 and older are the most likely to spend more than 40 hours per week online confirms research from the CIBER group questioning whether digital natives are inherently the heaviest internet users in a higher education context.<sup>11</sup> Older and graduate students have likely incorporated internet use into their professional lives as well as their social and academic endeavors, thus raising their overall levels of engagement.<sup>12</sup>

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**TABLE 3**  
**Use of Emerging Technologies by Age**

		Age of Respondent				
		17-19	20-22	23-26	27-30	31+
Web Calling	No. of students	200	289	127	68	63
	% within age	16%	18%	31%	40%	33%
Second Life	No. of students	57	126	48	17	19
	% within age	5%	8%	12%	10%	10%
Blogs	No. of students	182	246	95	45	38
	% within age	15%	16%	23%	27%	20%
Web-based IM	No. of students	875	1049	239	91	82
	% within age	71%	66%	59%	54%	43%
Podcasts	No. of students	357	453	143	62	77
	% within age	29%	29%	35%	37%	41%
Text Messaging	No. of students	1107	1349	275	98	97
	% within age	89%	85%	67%	58%	51%
Wikis	No. of students	808	1119	303	122	147
	% within age	65%	71%	74%	73%	78%

**Figure 5. Library Website, Facility, and Computer Use by Academic Status**

20-40% of students at all age ranges, with similarly higher use by younger demographics. Flickr is used most frequently by 27-30 year olds (21%), and was only accessed by 3% of 17-19 year olds. YouTube was accessed most heavily by the youngest respondents (67%), and least by 30+ year olds (25%). Less than one percent of all cohorts used Twitter or LinkedIn, while del.icio.us was little used in general but somewhat more so by older respondents.

Distinct usages of several internet and communication technologies emerge when respondents are segmented by age (Table 3). For example, only 29% of 17-19 year-old students listen occasionally or regularly to podcasts, whereas 41% of students aged 31 and older do.

### Library Use and Technology Receptivity

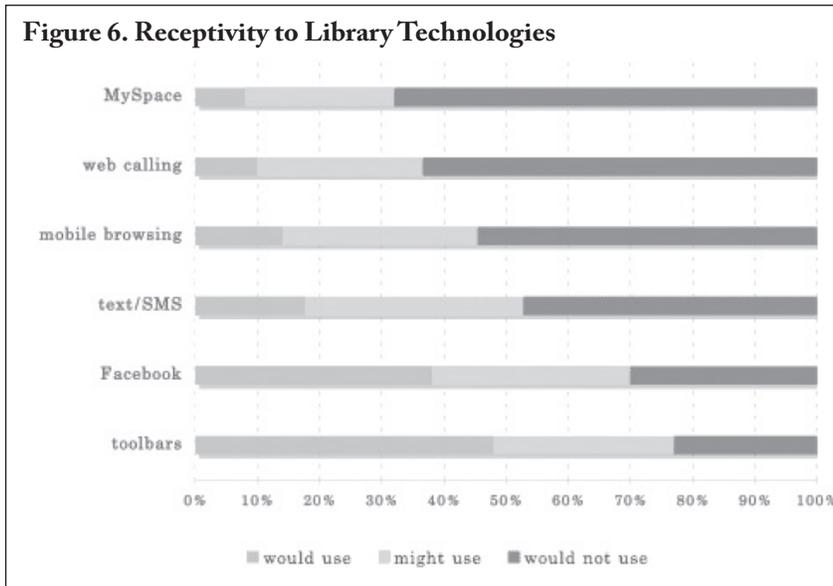
Survey results revealed a student population that in large part consistently utilized the Ohio University Libraries in the course of their academic endeavors, although to a greater extent its physical than its electronic facilities. Seventy-five percent of respondents visited Alden Library on at least a weekly basis, while 11% did so on a daily basis. Online resources were accessed less frequently—61% of participants made at least a weekly visit to the library's website, while 9% used the site on a daily basis. When asked what tasks they typically engaged in when visiting the library website, 71% of students indicated that they searched for books and journals, 62% searched for articles in a library-provided database, and 42% used InfoTree, the Libraries' sub-

ject resource portal. A further 36% searched the library website for DVDs and music, 15% used research guides or tutorials, and 15% asked a librarian for assistance.

Undergraduate and graduate students use online and physical library facilities at different rates and for different purposes. Figure 5 illustrates that while graduate students access the library website, building, and computers somewhat more frequently on average than undergraduates, they are considerably more likely to be heavy users of the library website.

Survey results indicated that Ohio University students desire convenient, accessible integration of library technologies into several specific academic and personal learning interfaces. Respondents were asked to rate how likely they were to use a number of technologies in a library context to perform specific tasks. Concrete examples were given for each technology, such as SMS overdue notices, etc., to ensure that respondents were able to comprehend the concrete form that each tech-based service would take.

Students were most likely to indicate interest in use downloadable toolbars in Firefox and/or Facebook library applications (Figure 6). Blackboard and other learning management system platforms cannot be considered "emerging" or "social" in the same manner as other technologies included in Figure 6, because they tend to lack many of the user-driven and dynamic aspects that have come to be associated with Web 2.0. That said, Blackboard library integration nonetheless rivaled browser toolbars as the most popular technology development option surveyed.



MySpace was almost uniformly rejected as useful in a library context, although older users were likelier to report receptivity to library MySpace applications. Library communication technologies such as texting, mobile browsing, and web calling are perceived as very useful by a smaller proportion of respondents, and as potentially or eventually useful by a larger proportion of respondents. In the case of mobile browsing and web calling, results indicated that each currently commands a small share of use relative to more established telephony and browsing tools, but are likely to become more socially viable as the technologies are adopted by greater numbers of users.

By academic status, undergraduates emerge as much more receptive to Facebook library applications and slightly more receptive to library services in Blackboard, but are less receptive overall to emerging library technologies than graduate students (Table 4). These findings are consistent with observed technology consumption patterns, which indicate that disruptive tools tend to be initially used by a niche audience and gradually become adopted on a wider scale. It is my opinion that higher education students consume technology-based library services using a similar model, but that adoption in the library context is as heavily motivated by academic status and information need as it is by an inclination toward technology itself.

### Implications and Implementation

Somewhat unexpectedly, the Ohio University environmental scanning project has had its greatest

programmatic effect beyond its intended focus of library technology services. Although its findings were extremely useful in their own right, the first survey instrument focused almost exclusively on technology and did not present a complete enough picture of how students perceived and used the library both physically and electronically to be broadly useful. Although it was not originally intended as part of the project, in order to evaluate our current and future technology services in the wider context of the relationships students formed with the Ohio University Libraries a second survey instrument was developed to provide greater in-

sight into student library perceptions. The first survey therefore explored the campus technology culture at Ohio University, while the second explored the campus library culture. This combination of data has provided essential insight into student perceptions of the overall character and quality of library services, and how technology might inform how these services as they are expanded and/or revised.

For the intended purposes of the Technology Team, Survey 1 informed the direction of library technology planning admirably. It identified Facebook, browser toolbars, and learning management system library integration as priority areas for student-focused development, while downplaying the current utility of MySpace library presence and more esoteric communication options such as web calling and SMS services. Subsequent discussions and focus groups have begun in multiple departments within the library to review data to consider new service ideas revolving around technology projects in general. Of critical importance, especially during periods of budgetary concerns, is how valuable a 2.0 technology may be in implementing a new service opportunity for the library in regards to time and expense. An example can be found in the results for questions dealing with IM and chat reference. According to user statistics of the Reference Department for the 2007-2008 school year, 6,088 instant messages and Meebo questions were answered by staff. Of those 6,088 questions, 3,971 were Meebo, 2,032 were IM, and 85 were through Groopz, a proprietary library

chat system which is no longer used. As many as 2336 of the respondents of the present survey indicated that they use Web-based IM, providing a concrete rationale for declining Groopz-based reference questions and justifying a Meebo widget-based reference option.

Beyond providing insight into the technology use and perceptions of the Ohio University Libraries academic user base, one of the most significant and unintended effects of the survey project has been to inform numerous policy issues having little to do with technology innovation. An open-ended response sec-

tion at the end of the survey enabled library users to offer feedback both positive and negative regarding any aspect of the Ohio University Libraries, and it is from this area that most administrative decisions to this point have originated. The policies that have been proposed and enacted as a result of open-ended feedback revolve mostly around physical access issues concerning computing facilities, the need for more quiet areas, and extended library hours. To this end, more computers were placed in designated quiet areas on the first and fifth floors of the library. Community members, who previously made up a significant

portion of overnight users, are now unable to use the library after midnight—students identified a clear need for more computer terminals during the surprisingly busy overnight hours. Another policy enacted was to create login timeouts so that open computers that have no activity will shut down after a certain amount of time, discouraging “camping” at valuable workstations. Both of these changes were met with little negative feedback, and after the initial implementation stage most community patrons complied without issue.

Suggestions from the survey that are being explored but have not yet been implemented involve both library space and technology issues. Regarding concerns about quiet areas and extended hours, the option of designating an additional overnight floor is under consideration. Currently the Learning Commons floor of Alden Library is open 24 hours a day, 5 days a week, closing at midnight on Friday and Saturday and reopening Sunday at noon. During the

**TABLE 4**  
**Receptivity to Library Technologies by Academic Status**

		Academic Status		
		Undergraduate	Graduate	Total
Facebook	No. of students	1,937	248	2,185
	% within ac. status	66%	42%	
	% of total respondents	55%	7%	62%
MySpace	No. of students	622	123	745
	% within ac. status	21%	21%	
	% of total respondents	18%	4%	21%
Browser toolbars	No. of students	2,269	482	2,751
	% within ac. status	77%	82%	
	% of total respondents	64%	14%	78%
Text messaging	No. of students	2,037	436	2,473
	% within ac. status	69%	74%	
	% of total respondents	58%	12%	70%
Mobile browsing	No. of students	614	131	745
	% within ac. status	21%	22%	
	% of total respondents	17%	4%	21%
Web calling	No. of students	1,006	287	1,293
	% within ac. status	34%	49%	
	% of total respondents	26%	8%	37%
Blackboard	No. of students	1,964	369	745
	% within ac. status	67%	63%	
	% of total respondents	56%	10%	66%

week of final exams it can become crowded and noisy. Statistics for the 2007-2008 year show that at the end of each quarter there were between 200 and 400 students present in the Learning Commons floor at midnight, whereas only approximately 100 computer stations and an additional 50 laptops are available. Opening a second floor for overnight service would free up additional computer stations, more group study rooms and tables, and provide additional space for quiet study. A number of suggestions were also made that have provided easy opportunities for small-scale improvements—for example, patrons asked for practical enhancements such as additional bulletin boards for student announcements and expanded leisure reading displays.

### Technology Adoption and Future Development

An important outcome of this project was to provide the Technology Team with an extended timeline for potential student adoption of specific emerging technologies. When considering services via new technology mediums, it is critical to consider how far ahead of the popular curve a particular tool might be prior to its development in a library setting. For example, Second Life was one of the least used social technologies surveyed, yet many educators and librarians have been studying and implementing services in virtual worlds such as this for several years despite evidence of declining use.<sup>13</sup> This scenario presents a common conundrum—individual libraries will have to decide if staffing and monetary concerns outweigh the potentially unexplored benefits of new technologies, and whether experimentation can enhance their overall ability to provide unique and useful services even if initial efforts are not adopted at the desired rate.

An experimental reference technology that illustrates this cost-benefit scenario at Alden Library is based in Skype, a free Voice over Internet Protocol (VoIP) internet calling program. Skype video kiosk and call-in reference services required significant time and effort to develop, with interaction from multiple departments and considerable training for librarians. Reference statistics indicate that Skype reference services are seldom used directly, but as a result of our development other applications of VoIP services have been explored. The technology has both been used to create ongoing reference relationships with faculty and international students, and to teach library ses-

sions to distance learning programs in Africa. The statistics for these learning events would indicate that limited numbers have benefited from the new service which is potentially misleading in terms of its future potential as more people adopt and routinely use Skype. Similar adoption timelines can be considered for SMS services, mobile browsing, and other technologies.

In sum, local environmental scanning can inform both the trajectory and timeline of technology development by testing demographic assumptions concerning student library and technology use in higher education. The experience of Ohio University dictates that when combined with insight into the level and quality of overall library services, local user research can prevent the common problem of technology services that are better intentioned than they are received.

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