Higher Education and Emerging Technologies: *Student Usage, Preferences, and Lessons for Library Services*

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This study examines the utilization and preference of popular Internet and communication technologies among students at Sam Houston State University (SHSU), a Carnegie Research Doctoral University in East Texas. The researchers wished to study the local relevance of various technology trends reported in librarianship literature and then to use the survey data to inform decisions regarding library service development. A survey was conducted to investigate student ownership of electronic devices and student usage of technologies such as text messaging, Twitter, RSS, podcasts, social networks, Second Life, and others. Survey results indicated that, while students do not wish to experience an overwhelming library presence on all social networking and Internet media, most do wish to have basic library services easily accessible through a few of the most popular social networking and Internet technologies. The investigators identified some unique trends in usage among their local population and have adjusted certain library services and plans in accordance with their findings. Other libraries are encouraged to study their own users and develop new services based on those users' needs rather than popular trends or surveys which may be based on radically different user groups.

As social networking and Internet technologies make significant strides in innovation and development, technology mediums for individuals to communicate with one another have increased exponentially. Although librarians have been early adopters of many information technologies, attempting to develop and maintain a presence on all available social networking and Internet communication mediums is a costly and inefficient service model for most libraries. Thus, selecting the most effective communication technologies for delivering library services has become a major challenge for many librarians. Furthermore, rather than blindly adapting the most visible emerging technologies touted by popular media, librarians must tailor library service delivery options to the distinct needs and preferences of their particular user population.

The purpose of this study is to survey student library users' utilization and preference of popular Internet and communication technologies at Sam Houston State University (SHSU), a Carnegie Research Doctoral University in East Texas. Given that the university campus is located about an hour north of the Houston metropolitan area with

a large population of commuter students, providing a virtual library presence beyond the physical campus is vital for improving the user experience. Moreover, since many of the students are also first-generation college attendees or students whose age or life circumstances is considered "nontraditional" among college students, it is also important for the library to examine the needs and technical abilities of these distinct user groups. A survey was developed to study students' ownership, usage, and perception of popular social networking and Internet technologies, and whether students would like to utilize library services offered through these technologies.

LITERATURE REVIEW

Today's typical college students have grown up with and been exposed to all manner of technologies in many aspects of their lives. On a daily basis they use computers, online social networks, cell phones, text messages, Twitter, RSS feeds, wikis, blogs, online learning tools, and much more. How students integrate these instruments into their lives has been the focus of much attention and research. Today's students, being familiar with second-generation technologies popularly known as Web 2.0, can find and use information; produce content in various formats such as posts, blogs, or videos; and push content to recipients by various media such as phones or computers.[1] However, specific skills, attitudes, and practices can vary among groups.

Librarians at Kent State University studying Web 2.0 technology usage in undergraduates found heavy use of Web 2.0 applications, which encourage connection, interaction, and sharing. Results revealed that students made a clear distinction between their social and educational locales online.[2] The boundaries between learning technologies and social technologies were more subtle among UK university students in varied disciplines who were organized and efficient at finding and handling information, able to multitask, comfortable with combining tools, adept at studying and learning in various environments at various times, and willing to share resources with peers.[3]

Interaction with peers is a significant factor in students' lives, and much research has been conducted concerning students' social behaviors. Past research concerning the use of instant messaging (IM) tools was compared to results of a study published in 2005. Similarities surfaced, including the implication that face-to-face communication was a preferred and useful form of communication, while cell phones and IM were overtaking other forms of interaction such as land-line phones and e-mail.[4] E-mail also lagged behind in preference for IM in survey results released in 2007 from 545 college students who favored IM technology for personal and social communication.[5]

In the academic realm, libraries have utilized IM technology to answer reference questions with varying results at different institutions. Analysis of one year's worth of IM session transcripts at Binghamton University Libraries revealed that 5 percent of users were from the campus community and 31 percent of all users were students, while a 2008 pilot project at California State University, Fullerton, increased synchronous virtual reference statistics by 49 percent.[6] Additionally, student focus group studies at Milner Library (Illinois State University, Normal) led librarians to drop their chat software program and migrate to an IM service after discovering that their chat service was underutilized.[7]

As a related topic, student communication and cell phone use have also been the focus of several studies. In a 2005 survey of 383 college-age young adults in four states, the majority of respondents used their cell phones to socialize, remain available, tell time, leave themselves reminders, and use contact list functions.[8] An additional popular function of cellular phones is text messaging (or "texting"). A focus group at the University of Huddersfield showed that students were generally open to the idea of receiving text messages about library news and functions, such as a reminder for an overdue book. However, they emphasized the importance of only receiving messages that were useful in nature.[9]

In 2007, Rich Ling and Naomi S. Baron compared texting and IM usage among twenty-two female college students. They looked at 191 text transmissions with 1,473 words and 191 IM transmissions with 1,146 words. They found, among other things, that respondents would text multiple sentence transmissions at least 60 percent of the time, while they would only IM multiple sentence transmissions 34 percent of the time.[10] IM was the most commonly used communication technology in a survey of 268 Canadian university students who were asked how they used IM, mobile phones (talking and texting), and e-mail.[11] In 2004, Kevin Lee and Stephen Perry surveyed 409 college students at a small college about their use of IM. They found that students dedicated a substantial amount of time to communicating regularly through IM, often even more than through face-to-face contact, and friends were the most important communication partners in their everyday lives.[12]

Many students also build social relationships online by using social networking sites such as MySpace and Facebook. Student usage of Facebook

was the subject of a study in which ninety-two undergraduates kept a diary-like log each day for a week. Results published in 2009 showed that students spent approximately 30 minutes on Facebook throughout the day, mostly reading and observing content.[13] In 2008, a survey of sixty-eight undergraduates found that 37 percent had one social networking account, 53 percent had two accounts, and 9 percent had three accounts. Students visited their accounts on average three times per day.[14] Highlights of the 2010 EDUCAUSE Center for Applied Research (ECAR) Study of Undergraduate Students and Information Technology, which surveyed over 36,950 college freshmen and seniors, indicated 96.6 percent of survey respondents used Facebook and 22.5 percent used MySpace.[15]

Students are not the only ones with online social accounts these days. At the time this paper was written, limited literature was available on student usage of the popular Twitter technology, although the 2010 ECAR study did report that 43.3 percent of students followed or used microblogs such as Twitter, but only 4.3 percent used Twitter in college courses. Similarly, information on student use of RSS feeds was scant.[16] However, what literature is available suggests that some colleges and universities use these technologies to communicate with students. Some institutions use Twitter to dispatch news and information to students, while others use RSS feeds to direct information into course management systems.

Additionally, some libraries are creating Facebook profiles. In 2007, librarians Sarah Miller and Lauren Jensen offered tips for increasing student response to library services and information via Facebook, such as understanding that Facebook is all about connecting with the students. The librarians suggest, among other things, keeping the profile active, updated, and current; using the newsfeed feature; replying promptly to student questions; sharing favorite books, interests, and quotes; and promoting new databases and library services.[17]

In a related vein, academic libraries have recently started to explore the possibilities that e-readers hold for their patrons. E-readers are a popular topic among media outlets. However, only a few studies have been published in scholarly journals about e-reader usage in academic libraries. One notable study was conducted at the Texas A&M University Libraries. They purchased forty Kindle e-book readers in 2008, at a cost of $399 each, and conducted a year-long study of usage. They concluded that the e-reader was an effective device for popular reading but had limited value for academic reading because of poor graphics, high cost, and limited content. Students rarely selected academic titles for the library to purchase on the Kindle.[18] E-readers were also not common among college students in the 2010 ECAR Study, with only 3.1 percent reporting that they owned a dedicated e-reader.[19]

Podcasts, on the other hand, are somewhat more promising academic tools in some cases. Researchers at the University of West England found that students did not want to relinquish being taught by traditional methods but believed that improvement in learning resulted when podcasts were used as an additional academic tool.[20] Additionally, the use of podcast lectures reportedly improved study and grades among undergraduate nursing students at the Washington State University College of Nursing.[21]

Many academic libraries produce podcasts, including the SHSU library. Reviewing the literature about podcasts shows that most institutions report positive results from their podcasts. They are an effective way to instruct, promote library services, and involve the student body with the library. Curtin University Library in Australia developed its own podcast series at the end of 2005. They used the series to promote library services and provide basic instruction in using library resources. In an article discussing the program, they wrote, "We have been amazed at the popularity of our podcasting series; download statistics have increased week by week. In October 2007 we had our thirty-three thousandth download since the release of our podcasting series in February 2006."[22] Moraine Valley Community College also had a successful podcast; Michael Stephens wrote in a 2007 issue of *Library Technology Reports* that "the Library Event PodCasts are intended to be a flexible, portable record of the events held within the Moraine Valley Library."[23]

METHOD

The population for this survey was the undergraduate and graduate student body of SHSU early in the Spring 2010 semester. The survey included both on-campus and distance-learning students, since the library strives to serve the diverse needs of both groups. Approximately 6,240 students, or 37 percent of the total student body, were selected using stratified random sampling to participate.

The survey questionnaire consisted of fifty-four questions, although not all questions required responses. Some questions were designed to appear only when participants selected a particular response in a prior question, so participants may not have encountered all fifty-four questions. Furthermore, not all questions required participants

to enter a response; therefore, unless otherwise specified, the percentages quoted in this paper indicate a percentage of an individual question's respondents, rather than a percentage of the total survey respondents.

The first section of the survey asked about participants' access to the Internet, type of Internet access, and computer and netbook ownership to assess levels of technological adaptation. The next section investigated participants' familiarity with and usage of a number of popular technologies, including e-readers, Twitter, RSS, podcasts, social networking sites, and mobile phones. Participants familiar with a popular technology were also asked to indicate whether they would be interested in library services offered through that specific technology platform. Demographic questions, including year of birth, gender, and student classification, were placed in the last section of the survey to avoid undue influence on participants' confidence and mindset. The complete survey instrument may be accessed at http://library.shsu.edu/libfac/StudentTechSurvey.pdf.

An initial invitation e-mail was sent to all subjects' official SHSU e-mail accounts on April 2, 2010. The invitation stated the purpose of the study and provided a Web link to the survey hosted through commercial online survey tool Survey Monkey. As an incentive for participation, the e-mail also mentioned a chance to enter a drawing for gift certificates upon survey completion. The survey was open for the duration of April, and a reminder e-mail was sent to all subjects one week prior to the survey closing date of May 7, 2010. Overall, 702 of the subjects responded and completed the survey for a response rate of 11.25%. A random number generator was used to select three winners out of all participants who chose to provide an e-mail address for the gift drawing. Winners were contacted by e-mail during the week following survey closing.

DEMOGRAPHICS

Undergraduate students represented just over 50 percent of the survey respondents, with 13.6 percent classified as freshmen, 14.4 percent as sophomores, 9.8 percent as juniors, and 12.8 percent as seniors. Master's students were the largest group represented in the survey results at 41.4 percent, while doctoral students comprised only 6.1 percent of respondents. Seven respondents (1 percent) were nondegree seeking or continuing education students, and six respondents (0.9 percent) selected "Other" as their classification with no explanation provided (see figure 1).

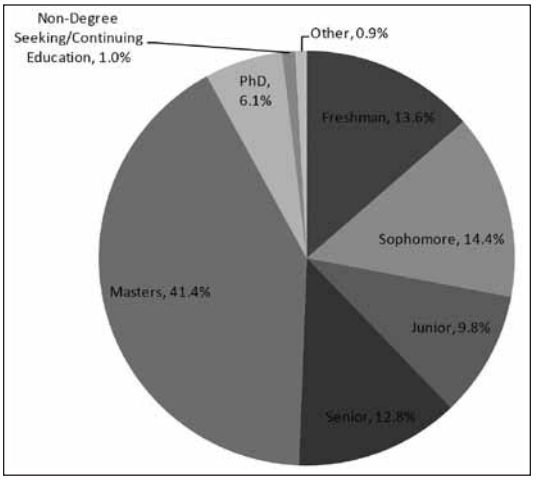

Figure 1. Student Classification of Survey Respondents

Of the 666 respondents who chose to reveal their gender, 71.6 percent were female and 28.4 percent were male. Of the 674 respondents who chose to reveal their age, 375 respondents were 25 years of age or younger (55.6 percent); 267 respondents were between the ages of 26 and 50 (39.6 percent); and 32 respondents were over 50 years old (4.8 percent).

In addition to student classification, gender, and age, survey respondents were asked to report in what college they were seeking a major or degree. At the time of this survey, Sam Houston State University was divided into five colleges. The largest group of respondents, 31.5 percent, selected the College of Education. The College of Arts & Sciences had 20.8 percent respondents, and the College of Humanities and Social Sciences had 17.1 percent. Another 16.2 percent of respondents were from the College of Criminal Justice, and 12.9 percent were from the College of Business Administration. Eleven respondents (1.6 percent) reported an undecided major.

Finally, students were asked to report the manner in which they attend classes (strictly face-to-face at the SHSU main campus or the SHSU annex campus, The University Center in The Woodlands, Spring, Texas; online; or blended face-to-face classes with online components). Students were allowed to check all that applied, so the percentages will total more than 100 percent. The largest response, 55.3 percent, was for face-to-face (F2F) classes on the main campus blended with an online component. Main campus F2F classes without an online component received the second highest response rate, 42.7 percent. Another 13.8 percent of respondents take F2F classes at the annex campus blended with

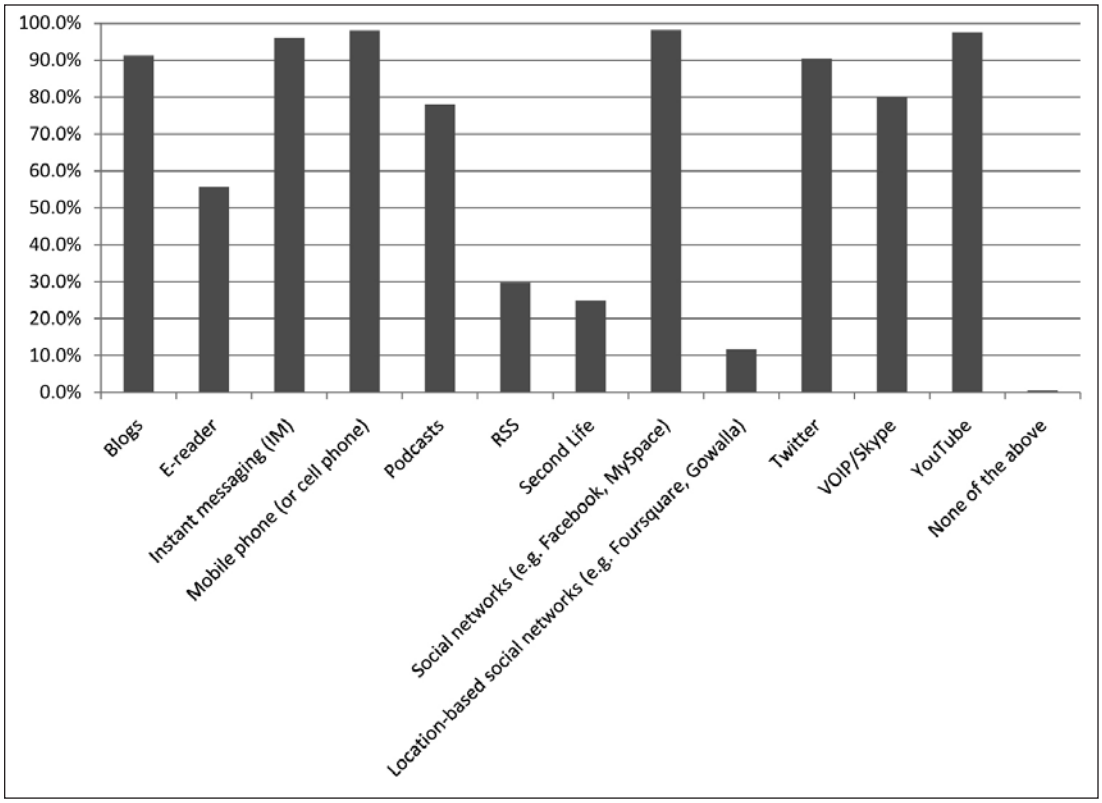

Figure 2. Student Recognition of Technology Names

an online component, while 8.6 percent take F2F classes at the annex campus without an online component. Strictly online classes were taken by 30.6 percent of the respondents.

RESULTS

At the time of the survey, about 97 percent of student respondents had Internet access at home, with almost 76 percent of those having high-speed DSL/cable Internet. However, almost 2 percent of students had only dial-up Internet access, and 3.4 percent of students did not have any access to the Internet at home. Just under 56 percent of students used a desktop computer at home, and 90 percent of those desktops were PCs. Almost 92 percent of students used a laptop computer (though the survey did not distinguish between those who personally owned a laptop and those who might borrow one from a family member, roommate, etc.), and 86 percent of those laptops were PCs. Less than 8 percent of students owned a netbook. A little over 97 percent of student laptops had wireless Internet access, but just over 2 percent did not. Student computers, both desktops and laptops, averaged between 1 and 4 years old, with laptops slightly more likely to be 1–2 years old and desktops slightly more likely to be 2–4 years old.

Students were asked to indicate which in a list of popular or emerging technologies they recognized by name. Social networks like Facebook or MySpace had high name recognition (over 98 percent), while newer location-based social networking services like Foursquare, Gowalla, and Loopt had low name recognition (less than 12 percent). Figure 2 shows the full list of responses.

Students were then asked a series of questions about several technologies of particular interest to the library. The following sections investigate the specific responses pertaining to each technology.

E-Readers

Only 10.5 percent of students owned an e-reader at the time of the survey, while another 44.7 percent reported an interest in owning one. The other 44.7 percent reported that they had no interest in owning an e-reader. Of those students who already owned an e-reader, Kindle was by far the most common, with almost 70 percent ownership. The Sony Reader and the Barnes and Noble Nook had the next two highest levels of ownership, though both still claimed less than 10 percent of the

respondents. Almost 85 percent of students said they used their e-reader for recreation, 68.5 percent for education, and only 9.6 percent for work.

When asked about interest in possible library services that use e-readers, students indicated a slightly higher level of interest in services involving library-loaned e-readers versus student-owned e-readers. For instance, 64.6 percent expressed an interest in checking out an e-reader preloaded with course textbooks and 58.7 percent wanted to check out e-readers preloaded with course reserves, whereas only 54.3 percent were interested in checking out digital books and other content to read on their own personal e-readers. Use of the e-readers for less course-driven, more recreational material was slightly lower still: 45.5 percent of students had interest in borrowing e-readers preloaded with popular titles like New York Times bestsellers, and only 36.1 percent said they would want to download and read newsletters from university offices and departments. Almost 23 percent of respondents reported that they had no interest in library services that use e-readers.

Mobile Phone

Mobile phone ownership, although not entirely ubiquitous, was very high: 98.8 percent of respondents reported ownership of a mobile phone. Another 0.9 percent reported interest in mobile phones despite their lack of one, but two respondents (0.3 percent) indicated that they had no interest in owning a mobile phone.

The largest group of students (32.5 percent) owned phones between 1 and 2 years old. Another 23.9 percent owned phones 7–12 months old, and 27.3 percent owned phones only 1–6 months old. Students also reported owning phones that were less than 1 month old (4.3 percent), 2–4 years old (8.7 percent), or more than 4 years old (3.2 percent).

Brands of mobile phones varied widely, but worth noting is the fact that only 15 percent of students surveyed owned an Apple iPhone and less than 11 percent owned any style of Blackberry. The number of people owning Android-based smart phones was more difficult to determine because the survey asked for the phone's manufacturer without distinguishing between operating systems, and a manufacturer may sell both Android and non-Android phones.

Text messaging ranked second (94.4 percent) only behind phone calls (97.3 percent) in student usage of mobile phone features, and 84 percent of respondents indicated that they used text messages on a daily basis. Other heavily used features included photo/video (82.1 percent), Web browsing (47.4 percent), e-mail (45.5 percent), playing MP3 audio files (41.9 percent), using a touch screen (41.7 percent), downloading and using apps (36.6 percent), and chat/IM (29.4 percent).

Regarding mobile phone services, 56.3 percent of students reported an interest in asking the library questions through text messages, a service which the library just introduced during the 2009–2010 academic year. Another 36.5 percent reported an interest in asking the library questions through IM from their mobile phones. The most desirable service, selected by 64.8 percent of students, was the ability to renew books from a mobile phone. Searching for and reading journal articles on a mobile phone were activities of interest to 39.4 percent of students.

One student wrote in a comment that the library should send text message alerts when an item is due, while another student specified that any text message interactions should be initiated or requested by the student—students considered unsolicited text messages from the library undesirable.

Twitter

The Twitter microblogging platform has not been heavily adopted at SHSU: barely 21 percent of respondents reported usage and only 10 percent reported an interest in usage. Of those few who used it, the majority of use (73.6 percent) was recreational and only 42 percent was educational. Almost 69 percent of students surveyed had no interest in using Twitter, and nearly 75 percent of students surveyed had no interest in library services using Twitter. Just under 20 percent expressed a desire to ask the library questions via Twitter, and just over 20 percent wanted to follow Twitter updates on library news, events, and resources—a service which the library has provided since mid-2009.

RSS Feeds

Only 16.4 percent of students reported subscribing to any RSS feeds; almost 22 percent reported an interest in them despite not using them, while nearly 62 percent stated that they had no interest in RSS feeds.

Although close to 70 percent of respondents reported no interest in library services using RSS feeds, about 24 percent were interested in updates on new library books and resources, and a little over 21 percent were interested in updates on library news and events.

Of the 112 respondents subscribing to RSS feeds, almost 61 percent reported that they used

the feeds either daily or weekly. The most common method of subscription was in a browser: Internet Explorer Feeds (19.6 percent) and Firefox Live Bookmark (13.4 percent) were the first and third most common methods, respectively, with iGoogle ranking second (17 percent). Other commonly used tools for RSS feed subscription, closely ranked in popularity, can be seen in figure 3.

Chat/Instant Message

Of the respondents surveyed, 64 percent said they used chat/IM services. Almost 8 percent did not use IM services but were interested in doing so, and 28 percent had no interest in IM. Among those students who used IM services, the most popular tool was Yahoo! Messenger (35.4 percent), with no other IM tools topping 15 percent.

Almost 56 percent of students conveyed an interest in asking the library questions through IM, a service which the library has provided for several years through various platforms; 30 percent were more specifically interested in being able to add the library to a contact list or "buddy list" within their preferred IM program, a mechanism for making it easier to contact the library in the midst of regular IM activities without having to visit the library's website. Library services using IM held no interest for 42.7 percent of students.

Podcasts

About 36 percent of students said that they download or listen to podcasts, primarily for recreation (68.4 percent) but also for education (67.6 percent) or work (20.1 percent). Most reported using them only occasionally (48 percent), with 23.4 percent reporting monthly use, 20.9 percent reporting weekly use, and only 7.8 percent reporting daily use of podcasts. Podcasts were of interest to but not used by 28.2 percent of students, and 35.7 percent had no interest in working with podcasts.

Within the realm of library services that use podcasts, the service of most interest to students (56 percent) was podcasts on topics in their subject area (such as literature, criminal justice, business, etc.). About 29 percent of students also expressed an interest in instructional podcasts about using the library, and 28 percent said they would like to hear local history podcasts, a series of which the library actually has been producing for almost four years. Almost 40 percent of student respondents were not interested in any library services using podcasts. Several students wrote in that they would like to see entertaining, student-created content in a library-produced podcast series.

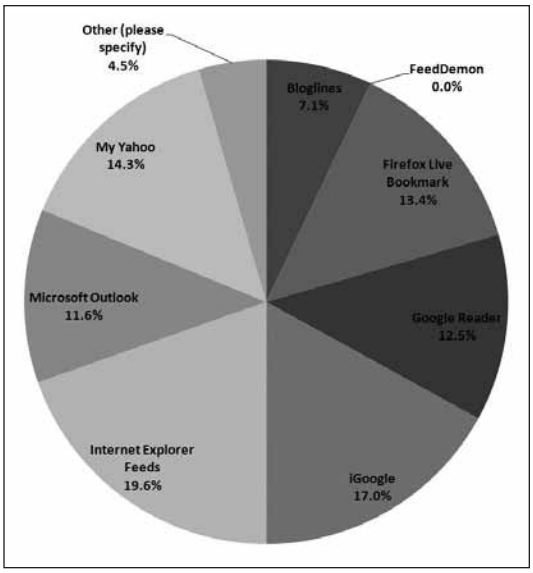

Figure 3. Feed Reader Tools Used by Students

Other Technologies

Students were given a list of other popular or emerging technologies and broadly asked whether they would be interested in library services using these technologies, though no specific examples of such services were provided. Almost 48 percent reported an interest in seeing library services in social networking sites such as Facebook and MySpace; 37.6 percent were interested in services using YouTube; and 34 percent were interested in library blogs. The remaining technologies received relatively low responses, as illustrated in figure 4.

DISCUSSION

E-Readers

According to the survey, only a small percentage of students owned an e-reader. Consequently, there is little reason for the library to develop library services for e-readers at this time. However, e-reader prices are declining, and 45 percent respondent interest in owning an e-reader indicates that such services may be desirable in the future. The data also suggests that any ventures into e-reader services should begin by building on existing services as opposed to creating entirely new e-reader services. For example, the library already has a service to provide print and electronic reserve materials, so offering e-readers preloaded with course reserves might be a valuable expansion of that existing service, without the investment of time, money, and energy to develop exclusive new services.

Students indicated a very high level of interest

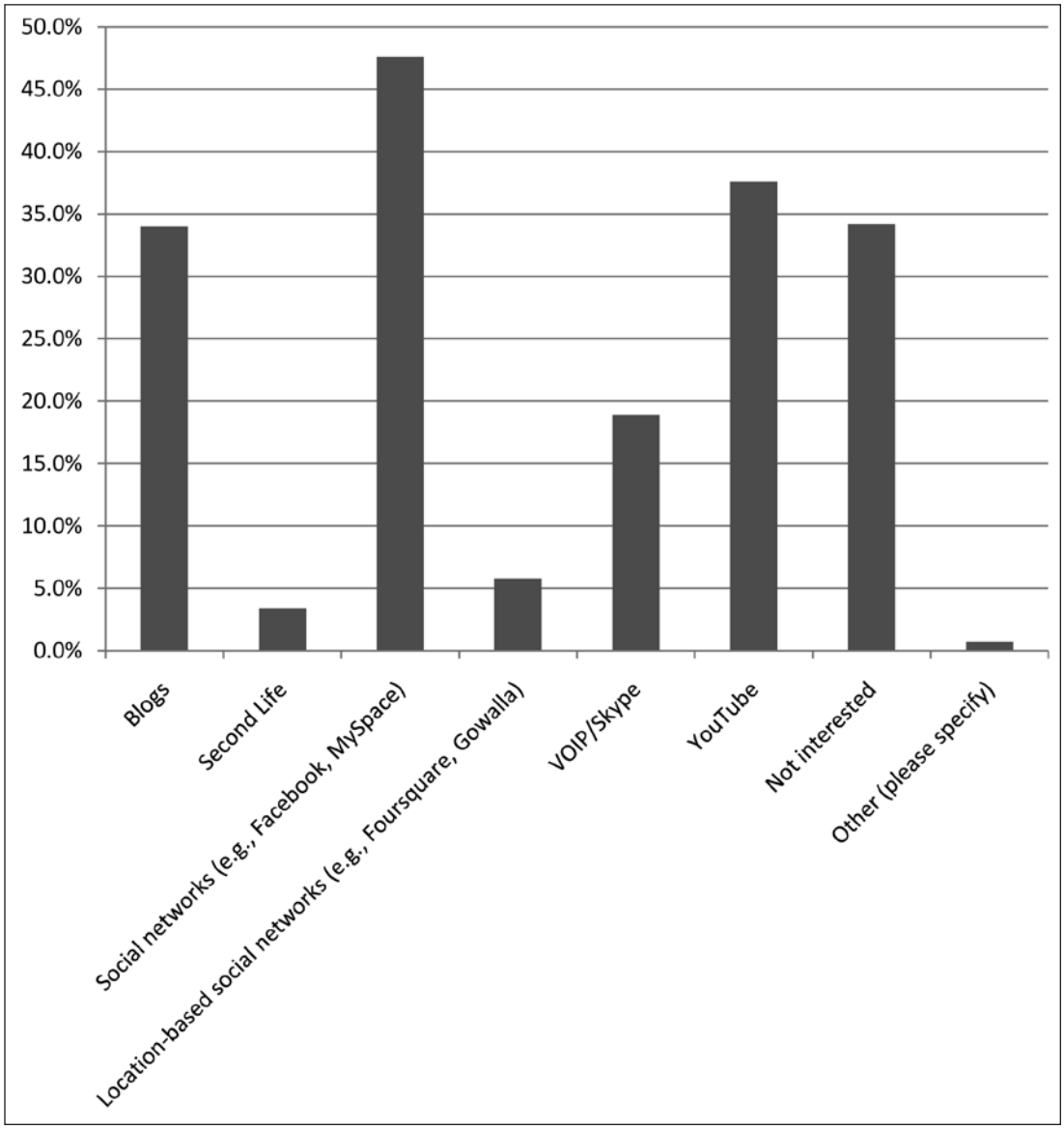

Figure 4. Student Interest in Library Services Using Various Technologies

in checking out e-readers preloaded with course textbooks. This response is unsurprising because the cost of textbooks already encourages many students to seek them at the library. The popularity of this suggested service may have much more to do with the content than with the format; in other words, it may be that students really desire free textbooks from the library, not necessarily electronic textbooks. Unfortunately, the library's current collection development policy discourages the purchase of textbooks, and the costs involved currently place an e-textbook service out of reach. On the other side of the matter, it would be interesting to know why some respondents expressed no interest in borrowing textbooks on e-readers. The investigators assume that it relates to freedom for note-taking and highlighting, reading ease and comfort, portability concerns, and overall comfort level in using paper versus electronic media. Student disinterest may also relate to the depth of content a student is trying to absorb when reading course textbooks: Terje Hillesund conducted a study in which users showed a preference for paper when the content was dense or required immersive reading, versus a preference for electronic when the text was merely skimmed.[24]

Students also indicated high interest in borrowing e-readers preloaded with fiction and nonfiction bestsellers; however, the investigators believe this service better serves the mission of a public library. For an academic library, providing access to popular bestselling titles is not part of

the primary mission. Users further reported interest in downloading books, newspapers, and university newsletters and publications to read on their own personal e-readers. However, given the reported level of e-reader ownership, the best course for the library is to wait and reconsider support for these sorts of services in the future, if or when e-reader ownership increases in the local student population. As a side note, a surprising 36 percent of respondents expressed an interest in reading campus newsletters on e-readers; it is unclear whether this interest is genuine or whether the students just marked all possible services listed in the survey instrument.

Mobile Phones

The library implemented SMS text reference service during the 2009–2010 academic year. The high rate of interest expressed in survey results reaffirms the need to have this service. However, some write-in comments indicated a lack of knowledge about the service's existence and highlighted a need to explore better marketing.

As mentioned in the results section, renewing books is the most desirable service for the mobile phone. Due to the risk of brute-force Internet attacks into the integrated library system (ILS), the Newton Gresham Library has turned off user account features in the local catalog. As an alternative, the library provides an online form for users to request book renewals. Although not an optimal solution, this is necessary until the ILS vendor resolves the security risk. Survey responses indicate a need to increase the visibility of the online renewal form and create a version designed for the mobile environment. This would complement the library's current endeavors to develop a mobile website.

Respondents also indicated some interest in searching for and reading journal articles on their mobile phones. Unfortunately, the ability to provide this service lies with the database vendors rather than the library. Although many vendors are releasing mobile versions of their database interfaces, the library ideally prefers to endorse mobile websites accessible to many devices, rather than device-specific apps. The library also wishes to promote mobile databases carefully so that, while sharing information about their existence, no bias is perceived in favor of databases that provide mobile access over those that do not.

When students were asked what mobile services they wanted from the library, inadvertently two separate choices were combined in the survey instrument: "Read electronic books or course reserves" and "Search for library books." Regretfully, this rendered the responses invalid, and therefore implications for these services cannot be addressed.

Nearly one quarter of respondents expressed no interest in library services using mobile phones. This was a surprise. Some respondents specified that they did not want to pay for more technology and library services. Even if the library service is useful and the tool is free online, costs may go up for data use on their mobile phones.

Twitter

A low percentage of respondents indicated use of or interest in library services on Twitter. The library currently uses Twitter as a newsfeed tool because it is easier to update than static HTML, especially from remote locations during unexpected circumstances (for instance, the SHSU campus was affected by Hurricane Ike in 2008). Comment and response features in Twitter have been turned off because the library's purpose is not to provide a social network. Low respondent interest reaffirms the choice not to use Twitter as a social network: users indicated they want to "like" the library on Facebook, but not "follow" it on Twitter, which was informative. Based on the survey responses, the labeling of the newsfeed has been changed so that the branding is not specific to Twitter and an option to subscribe via Facebook has been added.

RSS

A little more than a quarter of respondents indicated recognition of the term *RSS*. A very high percentage indicated no interest in library services using RSS. Low use and no interest do not necessarily mean that the library should avoid using RSS, but it does very strongly indicate that the term *RSS* itself has little or no meaning for the average student user. Users may subscribe to RSS feeds or use RSS-based services like an iGoogle homepage, but they do not know the official name for the technology they are using. The library currently provides an RSS feed listing new books and should rename this feed without including the term *RSS*. The standard orange RSS icon and words like *subscribe*, *sign up*, or *feed reader* may be more recognizable than the actual term *RSS feed*.

The library website is being reviewed for brand-specific names and technological jargon to be sure that any uses of these are appropriate. Other libraries may also want to consider labels that are clear, simple, and descriptive, instead of using specific product or technology names that may be unfamiliar or unfavorable to some students.

Chat/IM

The library currently provides a reference live chat service through IM technology. The high interest from the survey population reaffirms the decision to implement and maintain this popular service.

Survey responses indicated an unexpected interest in being able to add the library to the student's IM buddy list. When the library initially established reference chat using IM, the decision was made not to add users to a buddy list, primarily because the usernames were anonymous and changed for each interaction. No one foresaw a need for users to "buddy" the library. In light of the survey results, however, buddying the library is likely a shortcut for accessing the library chat service. Some users tend to keep an IM program open while working on a computer, and it may be easier to click on the library in a buddy list than navigate to the library's website. Introducing the ability for users to add the library to their buddy lists will add value to the existing service. At the same time, however, the library upholds its decision not to add users to the library's buddy list, as it still adds no value for the reference librarians.

Podcasts

The library currently creates podcasts, primarily on historical and local interest topics. Prior to this study, the investigators assumed that there would be no interest in library podcasts. Although other studies have shown them to be popular in certain contexts, local usage statistics have never reflected that trend, showing little to no use of the local history podcasts. However, an unexpected 56 percent of respondents expressed an interest in library-created podcasts related specifically to their areas of study. Usage statistics may increase if podcast topics are better matched to students' expressed interests, such as discipline-specific research or instruction topics. The library may also eliminate or at least downplay the term *podcasts* and instead focus on words such as *listen to*, *watch*, *audio and video*, etc. to avoid using technological jargon that may be unfamiliar or unappealing to users. Even with a new thematic focus, there may or may not be a gap between reported interest in and actual use of podcasts; this would require follow-up research.

Other Technologies

Respondents were also questioned on other technologies that could be considered for future library services.

The investigators were surprised by the responses concerning social networks such as Facebook and MySpace. The percentage of respondents who indicated interest in library services in Facebook was higher than expected. The expectation was that students would see these sites as recreational social spaces and would take the attitude of "we don't want parents at the party." However, changes to Facebook configuration over the years may have helped to change that attitude. At one time, a user had to "friend" an organization's Facebook page in the same manner as an individual person's page, thus making the user's personal profile visible to the organization; now users simply "like" a fan page, and a user's personal profile remains inaccessible to the organization operating the fan page.

Facebook could be another possible venue for reference services, though it would require the time and labor of library staff to monitor comments and respond in a timely fashion. Without employing the community conversation aspect, it would largely duplicate the way that the library currently uses Twitter as a newsfeed. For the time being, the library has chosen to create a simple Facebook page, which includes some links and search widgets, but which is not marketed as a space for asking reference questions. Our newsfeed content is fed simultaneously to both Twitter and Facebook, thus expanding the number of ways in which a user can subscribe to library news. Further research investigating what students want from the library in Facebook may lead to additional services on that site in the future.

YouTube received high reported interest for library services. The investigators are unsure how to interpret this response. The library has instruction videos which do not get used very often. If these videos were in a channel on YouTube, a site where users are already present, the videos might get used more. A YouTube channel would provide an additional opportunity for making content available and spreading the library's branding beyond its website. However, technical considerations do come into play, as many of the existing library instruction videos were created in formats that are not compatible with YouTube. As the library updates and adds to its online instructional materials over time, the librarians will need to simultaneously discuss the selection of video formats and the use of YouTube as a platform for video distribution.

There was not much indicated interest for library services using VOIP/Skype, location-based social networks, or Second Life. Students indicated high familiarity with VOIP/Skype technology but little interest in library services. Location-based social networking—including services such as

FourSquare and Gowalla, and also known as geo-social services—was almost unknown among students. Although location-based social networking has been a big topic at recent librarianship conferences (for example, Computers in Libraries 2010 and Internet Librarian 2010), survey responses suggest that this library does not necessarily need to jump on this bandwagon immediately. Similarly, although Second Life has been popular in the general public, the local survey shows no interest for library services on this platform. Second Life has support at SHSU, but barely one quarter of survey respondents even recognized Second Life by name. This suggests that it is probably not worth the time and effort to establish a library presence in Second Life, regardless of the few university programs that are requiring or encouraging use of the tool by their students.

Because the popular adoption of new technologies often explodes quite suddenly, the researchers acknowledge that a lack of student use at this time should not warrant complacence. Awareness of and experimentation with new technologies should be an important component of professional development in the library. When librarians stay abreast of emerging trends such as location-based social networking, they will be strategically positioned to leverage these tools in new library service opportunities at the time that makes sense for the library in question.

CONCLUSIONS

Some limitations of this study should be acknowledged. First, definitions were not provided for all the various technologies surveyed. Therefore participants may have mistakenly indicated unfamiliarity with a popular technology because they were not knowledgeable about brand names associated with that technology. In other words, a participant who regularly uses an iGoogle homepage may not recognize that it employs RSS technology. Furthermore, due to stratified sampling of student class standings and an unanticipated higher response rate from graduate students, graduate students are over-represented in the survey results. Finally, the survey instrument was designed prior to the debut of the iPad and therefore does not include that technology.

In the course of the analysis, the investigators were surprised by a number of student responses, since the researchers had assumed that students used social technology but did not wish to interact with their library through these mediums. The survey results indicated this assumption to be invalid; students do welcome a library presence in specific types of social technology. The investigators learned that libraries cannot necessarily follow popular trends without studying the local population. Therefore, this study's findings are presented with a caveat: what is true for one library may not be true for others. The results of this study may not directly reflect the preferences of a different library's users, but they can serve as a starting point for libraries interested in studying their own populations.

This survey included questions that allowed respondents to provide free responses. Information overload was one of the most frequently written-in comments explaining resistance to adoption or lack of interest in library services; students reported that they felt unable to keep up with all of today's many tools for receiving and sharing information. Another recurring comment in the survey responses asserted that the library should focus on performing very well in those things most closely related to its core mission instead of attempting to participate in all new technologies. Altogether, these comments clearly indicate that the library should focus on extending its services into a few popular platforms where the greatest interest lies but not try to extend comprehensively into all possible technological venues. Students' comments repeatedly implied that all the technology in the world does not make up for essentials: without excellent core services, a flashy library presence in the Web 2.0 world adds little value to the user experience.

FURTHER RESEARCH

Several issues raised in the discussion section deserve further investigation. Firstly, the survey was conducted just prior to launch of the Apple iPad. The iPad has since been hailed as the next disruptive technology, and other tablet alternatives have been released or announced, including the Blackberry PlayBook and several tablets that use the Google Android operating system or its latest release, called Honeycomb.[25] Consequently, a follow-up study assessing the impact of iPad and other tablets on users' information behavior would be timely. For instance, tablet ownership may greatly affect an individual's opinion on e-readers, as well as the usage patterns of mobile phones.

Users' preferences for receiving library services through mobile phones also warrant closer examination. As previously stated, just less than 25 percent of students reported iPhone or Blackberry ownership, whereas the number of students with other types of smart phones, such as those using the Google Android operating system, remains unclear. The type of phone and data plan would greatly impact users' ability and cost to use various

mobile Web services. Therefore, the library could be better informed by a study examining whether users' reluctance towards receiving library services via their mobile phones was due to pure personal preference or constraints imposed by their phone technology. For instance, less than 40 percent of students surveyed expressed interest in conducting journal article searches via mobile phones. This could be explained by a simple lack of interest in mobile databases, a lack of ownership of mobile phones capable of accessing such sites, or a concern about additional phone plan costs. To further illustrate this point, at the time of the survey, the majority of the researchers themselves did not possess mobile phones capable of such tasks.

Last but not least, based on responses to this survey study, several library services were implemented in accordance with respondents' preferred technology medium for utilizing these services. However, whether respondents will actually follow through on the preferences they expressed in the survey and use the new services remains to be seen. This suggests a possible follow-up study on the actual usage of these services.

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