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Presence and Use of Designated Charging Stations for Electronic Devices in Academic Libraries: An Exploratory Study

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Presence and Use of Designated Charging Stations for Electronic Devices in Academic Libraries: An Exploratory Study

By Lesley K. Mackie

Introduction

Charging stations for electronic devices have become ubiquitous in many settings. Device charging stations have been installed in airports to fill a need for travelers, as well as in gyms, restaurants and other spaces where people rely on their electronic devices to keep them in touch with others and for entertainment. Students are also away from home and rely on their electronic devices to keep them in touch and for research. Electronic devices (laptops, iPads, tablets, etc.) have become commonplace as students are constantly using these devices for study or personal purposes. A 2013 EDUCAUSE Centre for Analysis and Research (ECAR) study found that undergraduates owned two to three internet capable devices, 89 percent owned a laptop, and over 75 percent owned a smartphone (Dahlstrom et al. 2013). The pervasiveness of electronic devices was also highlighted in a 2012 ECAR study that found that over 96 percent of undergraduates at Georgia State University (GSU) used a laptop and over 59 percent used a smartphone (Dahlstrom 2012). In addition to student ownership of electronic devices, many institutions, including Georgia State University (Georgia State University 2010), require that their students have and/or provide their students with electronic devices.

While students at Georgia State University have access to a plethora of electronic devices (Dahlstrom et al. 2013), up until 2013 the battery power of electronic devices (e.g., through the installation of charging stations)

was not being addressed at GSU. To explore this further, a librarian at GSU conducted an exploratory survey to discover the presence and use of charging stations in libraries. This article addresses this infrastructure gap by looking at the presence and use of designated charging stations for electronic devices. Of particular interest were the institutions that provide and/or require their students to have electronic devices. This article presents the findings of the exploratory survey. Conducted in 2013, the information from this survey continues to be relevant as it can assist libraries that are considering installing charging stations for electronic devices as well as assist them in choosing what type of device to install; it can also assist with decisions on how to address battery power for electronic devices.

Literature Review

A review of the literature for "charging stations" revealed that the majority focus on charging stations for automobiles. Searches for information on charging stations for electronic devices returned few results; the most common centered on vendor information, studies identifying charging stations as a need (Brown-Sica 2012; Villa 2012), and institutional promotional advertisements regarding the installation of charging stations (Carter 2011). Examples of institutions with promotional advertisements include the University of Minnesota Morris, SUNY Fredonia, the University of Arizona, the University of Southern Indiana, and Xavier University (Bremer 2012; Maze 2012; The University of Arizona

2014; Clark et al. 2014; Hampton 2015). No studies were found regarding installed charging stations. The lack of literature suggests that while most institutions provide wireless internet access for students (Henderson et al. 2008), little consideration is given to the battery life of the electronic devices using the wireless internet.

Students have identified this lack of consideration for battery charging as one barrier to their use of electronic devices (Dahlstrom et al. 2013). They see battery life and the lack of electrical outlets as a major impediment in the use of smartphones (Nahrstedt et al. 2010) and laptops (Giacomini 2010; Fournier et al. 2010) as educational tools. A needs analysis by Lane et al. (2010) confirmed the importance of access to electrical outlets for students as it recommended the installation of additional outlets.

The *Library Journal's* "Twelve Keys to Library Design" (Sens 2009) lists lockers, with built in electrical outlets for charging electronic devices, as a way of going beyond the baseline of wireless internet access and infusing technology into library space. The use of space in libraries and institutions is an important issue, of which technology, including charging stations, needs to be considered. An ACRL (Association of College and Research Libraries) Research Planning and Review Committee report (2010, 288) lists "explosive growth of mobile devices and application will drive new services" as a top ten trend. The report projects that librarians will need to be creative to meet user needs as mobile devices will steer user demands and expectations as the number of electronic devices increase and mobile interface availability increases. A report from University of California San Diego (Bagwell 2010) discusses the need for mobile device charging stations to enable "learning on the go" for their students but lacks any literature to support this need and does not report on their installation.

Most of the literature that discusses the identified need for charging stations and the need to consider them in space allocations in libraries dates to 2010. Since then, little has been written on the use, need, and installation of charging stations.

Background

At the Georgia State University (GSU) annual librarian retreat in 2012, Bryan Sinclair, associate dean of public services, announced a new fund source for library innovation. Librarians anecdotally noted, from informal observation, that as the semester progresses students find all the locations throughout the library where one can sit and use an electrical outlet to charge electronic devices and work on their research. To meet this need students will use any outlet that they can locate; many students end up sitting on the floor. The idea of installing charging stations in the library (similar to those seen in airports) was proposed in order to enable students to charge their electronic devices, while providing a better alternative to sitting on the floor. The idea of installing charging stations was well received; a proposal was written and accepted for funding.

This proposal aligned with both the Georgia State University strategic plan and the library mission. The electronic device charging station proposal supports two of GSU's goals: to increase the level of scholarship support and to enhance supporting infrastructure for the conduct of research (Georgia State University 2011). Additionally, it supports the library's mission (Georgia State University Library Administrative Council 2011a) and the library's strategic initiatives (Georgia State University Library Administrative Council 2011b) to enable students to discover and use the library resources while promoting research, and by enhancing access to scholarly information. Providing students places to charge their electronic devices in the library facilitates electronic access to library resources.

Since this study began, a total of five KwikBoost charging stations were installed in the GSU library on multiple floors. The library also purchased individual chargers that students can check out. Librarians have anecdotally observed that charging station usage is high. To help students find them, the locations of the charging stations have been added to library maps. Additionally, the university has installed charging stations, as well as designated electrical outlets, at convenient heights (i.e., table heights) at various locations on campus.

Methodology

A survey of academic librarians was conducted to determine the presence and use of charging stations in academic libraries. The survey was created using SurveyMonkey. This survey was not formally validated; however, GSU librarians tested the survey to ensure that it functioned properly and to provide suggestions for changes. The reported results do not include the test survey results. Prior to distribution, the GSU Institutional Review Board received the survey for approval.

The survey can be divided into three main sections: basic information on the respondents' institutions, questions for respondents without charging stations, and questions for respondents with charging stations. The survey consisted of twenty-one questions (see Appendix A), each answer determining the next question. No participants answered all of the questions in the survey and participants could choose not to answer a question. The self-selecting participants in this survey remained anonymous; the only identifier being institution name, which they could opt out of providing. For maximum distribution the survey was emailed to GSU librarians with the request that they send it to all relevant listservs that they subscribed to (e.g., GLA, ILI-L Discussion List - information literacy).

The survey was open from July 15 to August 31, 2013. Selected dates corresponded with

librarians returning from summer vacations and the start of preparation for the fall semester, in order to reach the widest number of academic librarians available to complete the survey.

Results

The survey received 400 responses, four of which were incomplete, as respondents chose to immediately opt out from completing the survey. The survey was intended for academic libraries and included responses from both national and international institutions. The same number of respondents did not answer all the questions, as an option to skip questions was provided. In the following results, the percentages represent those who answered that particular question, with the number of respondents in parentheses. Figures are located at the end of the methodology section.

1. Demographics

Responses were fairly evenly distributed among all institution sizes: very large (>30,000 students): 17.1 percent (45), large (15,001-30,000 students): 25.5 percent (67), medium (5,001-15,000 students): 24 percent (63), small (<5,000 students): 33.5 percent (88) (see Figure 1). The majority of responses, 62 percent (163), came from public institutions compared to the 38 percent (100) of responses that came from private institutions (see Figure 2). The majority of respondents, 65 percent (158), were from institutions offering doctoral degrees while 18 percent (44) were from institutions offering bachelor degrees and 15 percent (40) from institutions offering masters degrees (see Figure 3).

When asked if their institution requires and/or provides electronic devices, 49 percent (130) responded that they do not, 28 percent (73) responded that they do, and 23 percent (60) responded that they did not know (see Figure 4). The 28 percent (73) who responded that they require or provide electronic devices were asked which electronic devices they require or

provide. Laptops were the most common response for both required and provided electronic devices and iPads were the second most common (see Figure 5).

Sixty-three percent (163) of respondents' institutions do not currently provide charging stations, while 31 percent (80) do provide charging stations, and 6 percent (16) were not sure if their institution provides charging stations (see Figure 6). Those who answered that they do not provide charging stations were directed to a different set of questions (section 2: No Charging Stations) from those who answered that they do provide charging stations (section 3: Charging Stations). Those who were not sure if their institutions provide charging stations were directed to the end of the survey.

2. No Charging Stations

The 63 percent (163) of respondents whose institutions do not provide charging stations were asked a series of questions as to the reasons why and the perceived barriers to providing this support. The majority, two thirds or 67 percent (104), of the respondents see a need for charging stations, 17 percent (26) of respondents do not see a need, and 16 percent (25) of respondents were not sure (see Figure 7).

When asked whether they were considering installing charging stations, 29 percent (45) responded that they are considering them, 26 percent (40) responded that they are not, and 45 percent (70) were not sure (see Figure 8). As to the time frame of installation, 43 percent (27) responded that installation was to occur in less than a year, 35 percent (22) responded over a year, and 22 percent (14) responded that
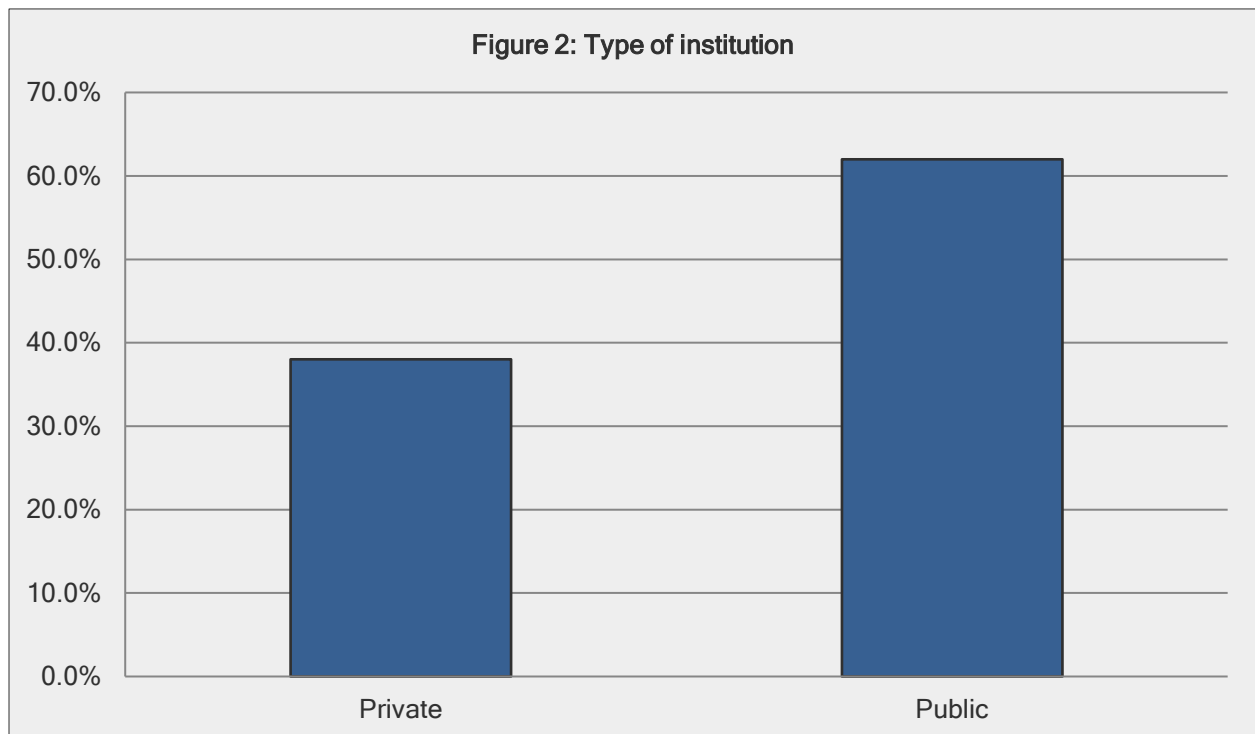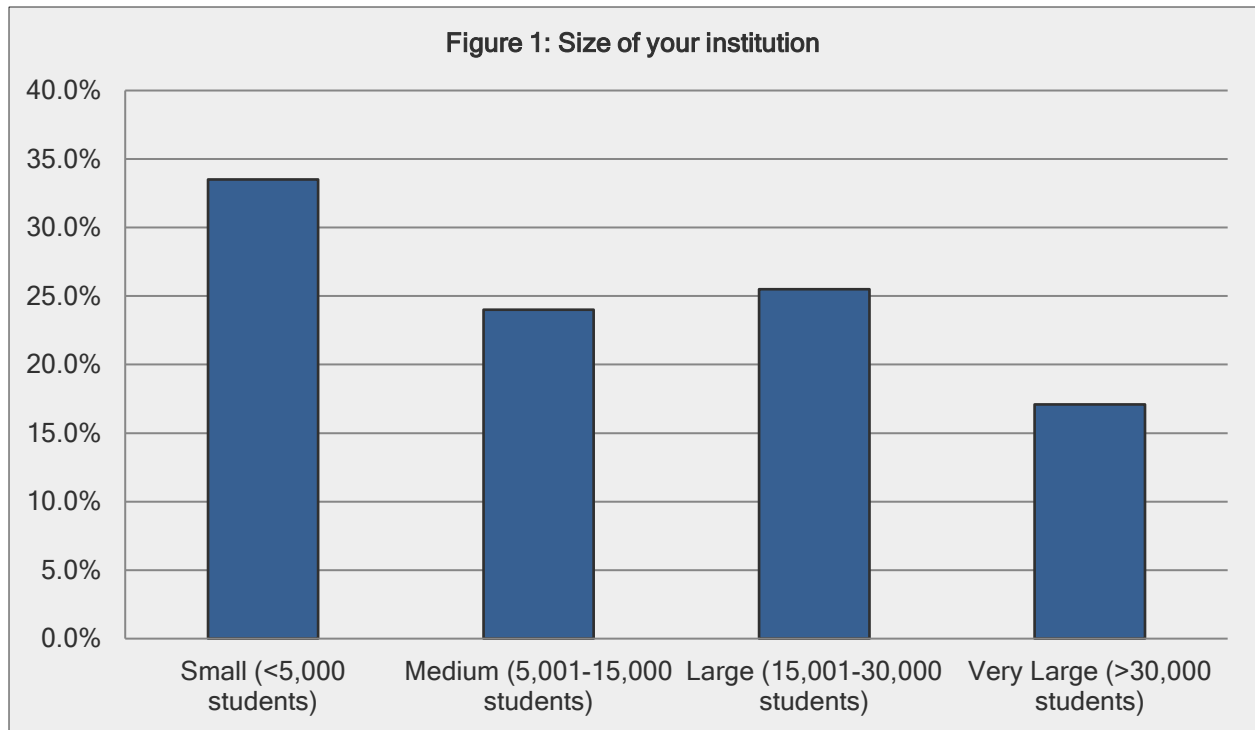
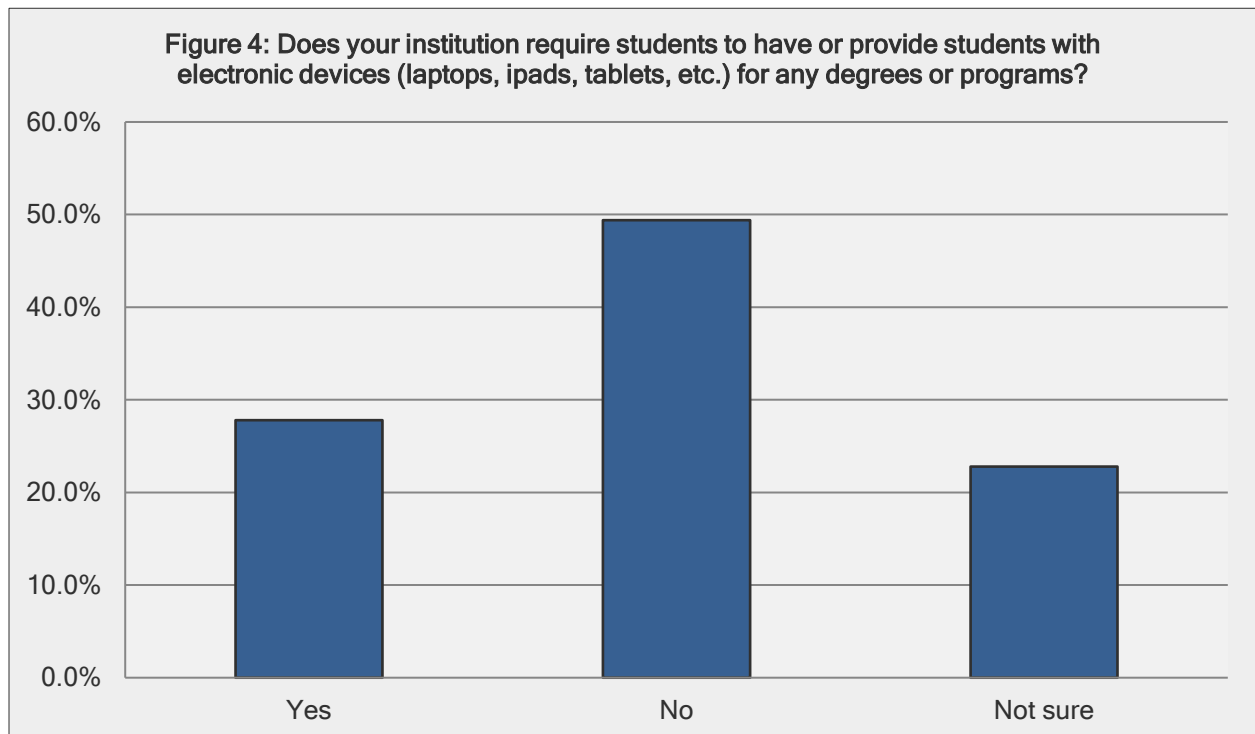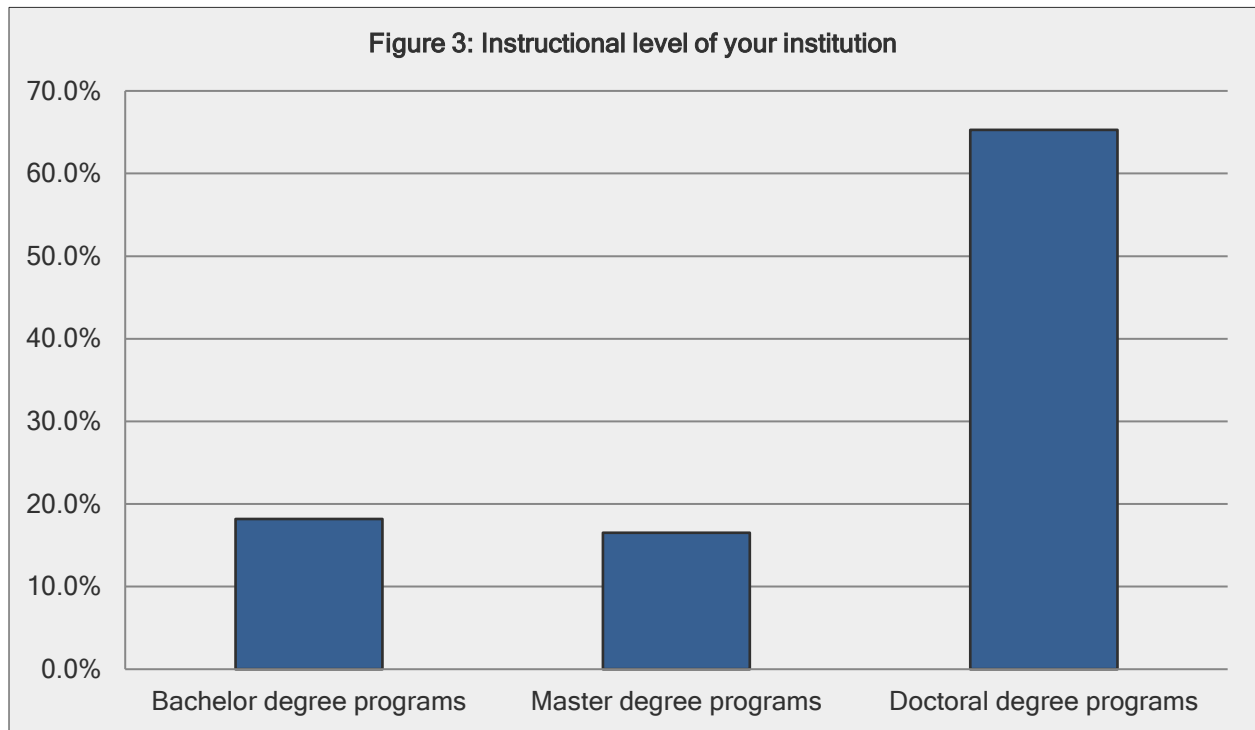the time frame for installation was over 2 years (see Figure 9).

When asked if there were restrictions to the installation of charging stations, over half, 55 percent (85), were not sure, 27 percent (41) did have restrictions, and 18 percent (29) did not have any restrictions (see Figure 10). When asked what the restrictions were, the main two responses were cost and electrical.
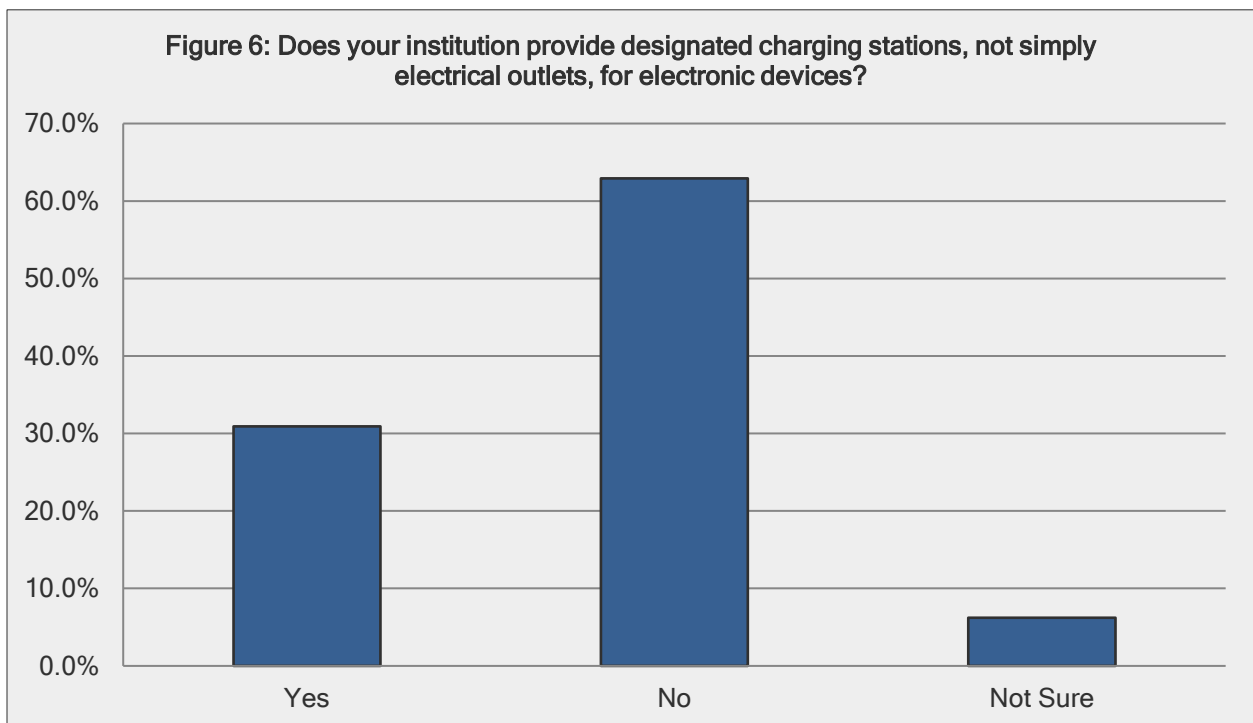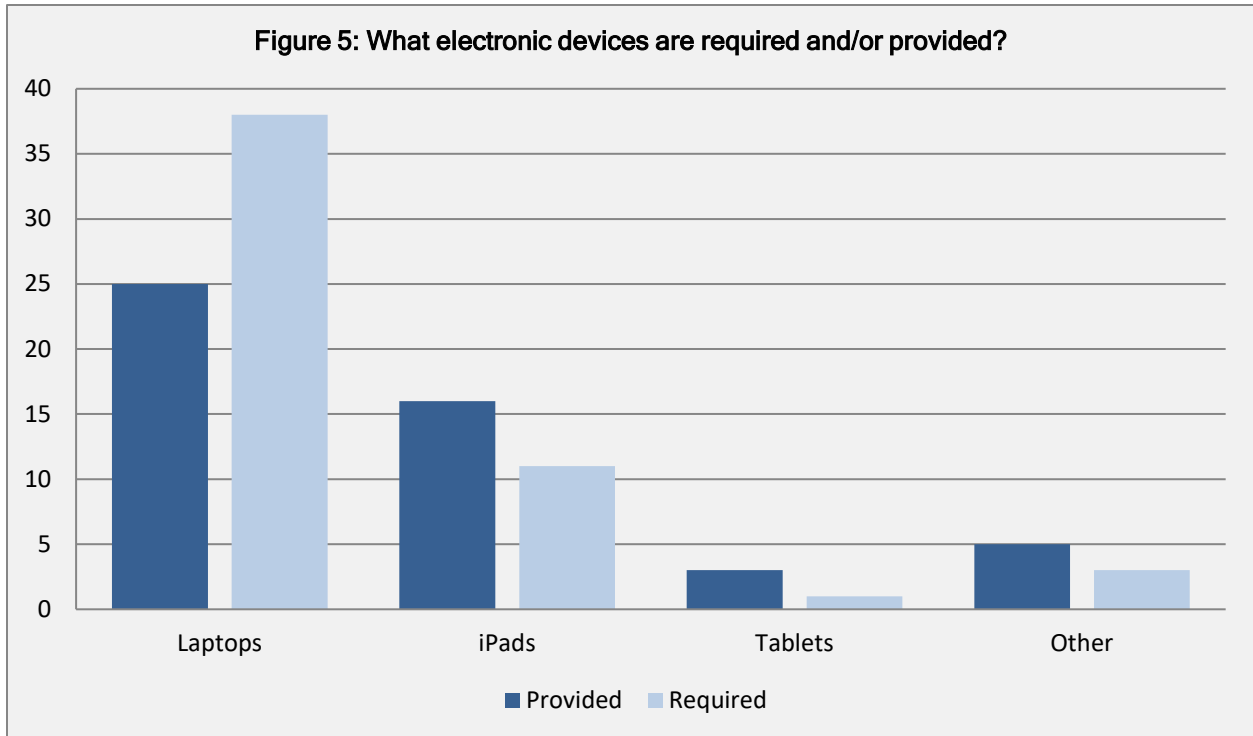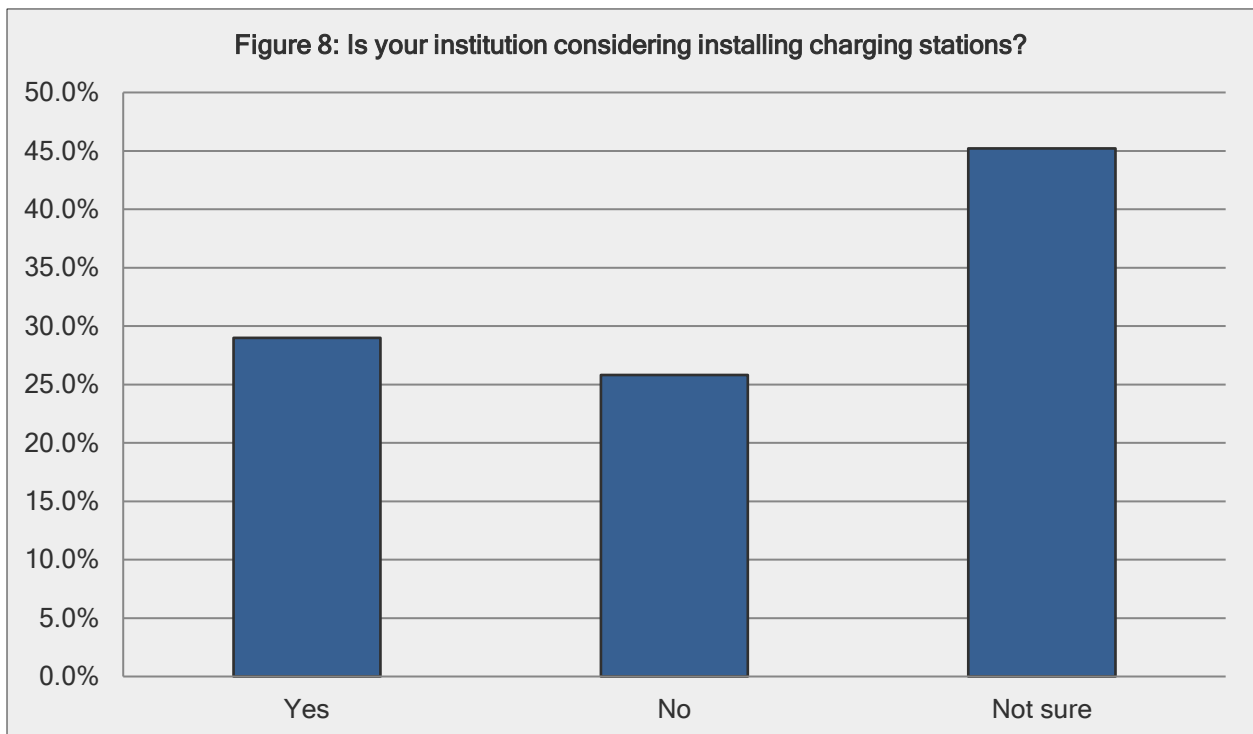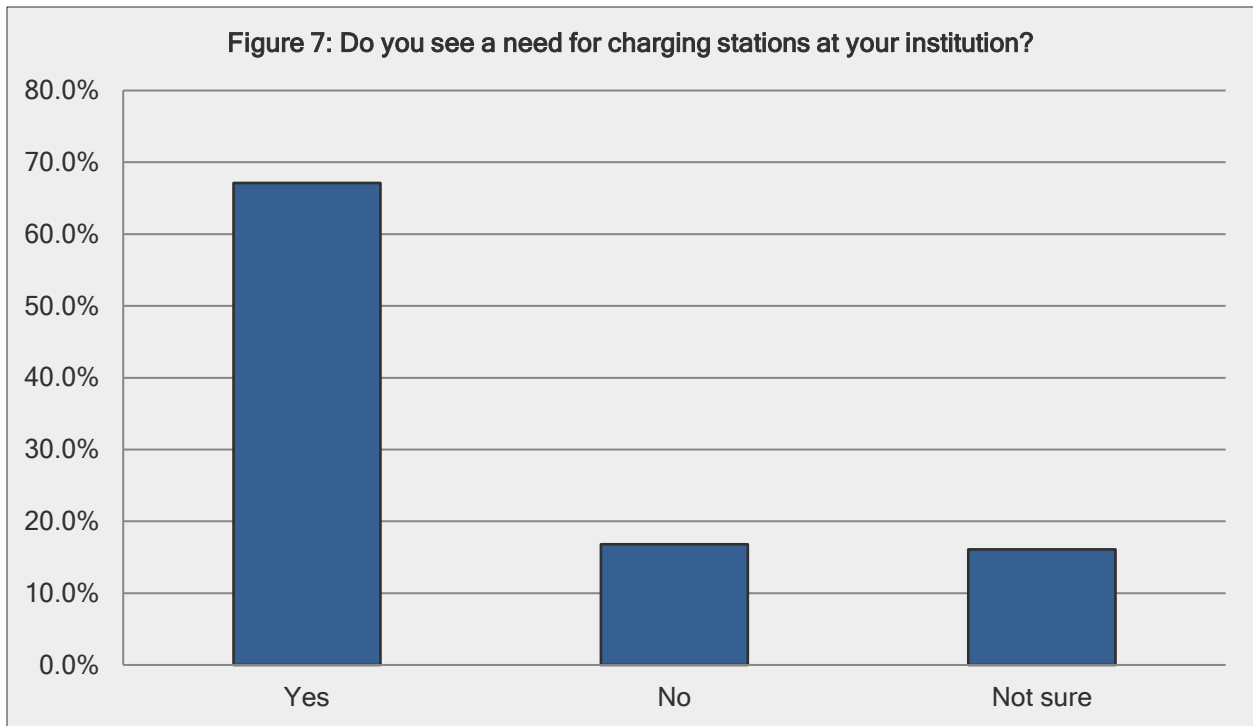
3. Charging Stations

The 31 percent (80) of respondents whose institutions do provide charging stations were asked a series of questions regarding their installed charging stations. When asked about the type of charging stations available in their libraries, 81 percent (47) listed multi-prong, commercially purchased stations as the most common, followed by designated outlets at 19 percent (11), and both charging lockers and super chargers tied for third at 8.6 percent (5) each (see Figure 11).

When asked how frequently the stations were used, the top two responses were occasionally with 31 percent (19) and frequently with 28 percent (17) (see Figure 12). Respondents were also asked for their opinion as to the effectiveness of the charging station, which they reported as an open-ended text entry. Responses (61) on effectiveness were mixed but the overall response was positive (e.g., "quite effective and well used" and "yes, very effective") with only three negative comments (e.g., "No, because their placement does not let a student tend to his/her phone-there are no seats nearby") and eighteen unsure either due to new product or not installed in the library (e.g., "don't know" and "We are just now installing them. Won't have a good reaction until fall semester.").

Figure 1: Size of your institution

Figure 2: Type of institution

Figure 3: Instructional level of your institution

Figure 4: Does your institution require students to have or provide students with electronic devices (laptops, ipads, tablets, etc.) for any degrees or programs?

Figure 5: What electronic devices are required and/or provided?

Figure 6: Does your institution provide designated charging stations, not simply electrical outlets, for electronic devices?

Figure 7: Do you see a need for charging stations at your institution?

Figure 8: Is your institution considering installing charging stations?

Figure 9: What is the installation time frame?

Figure 10: Is your institution facing any restrictions to the installation of charging stations? (i.e. cost, electrical)

Figure 11: What types of stations are installed?

Figure 12: In your estimation, how frequently are the charging stations used?
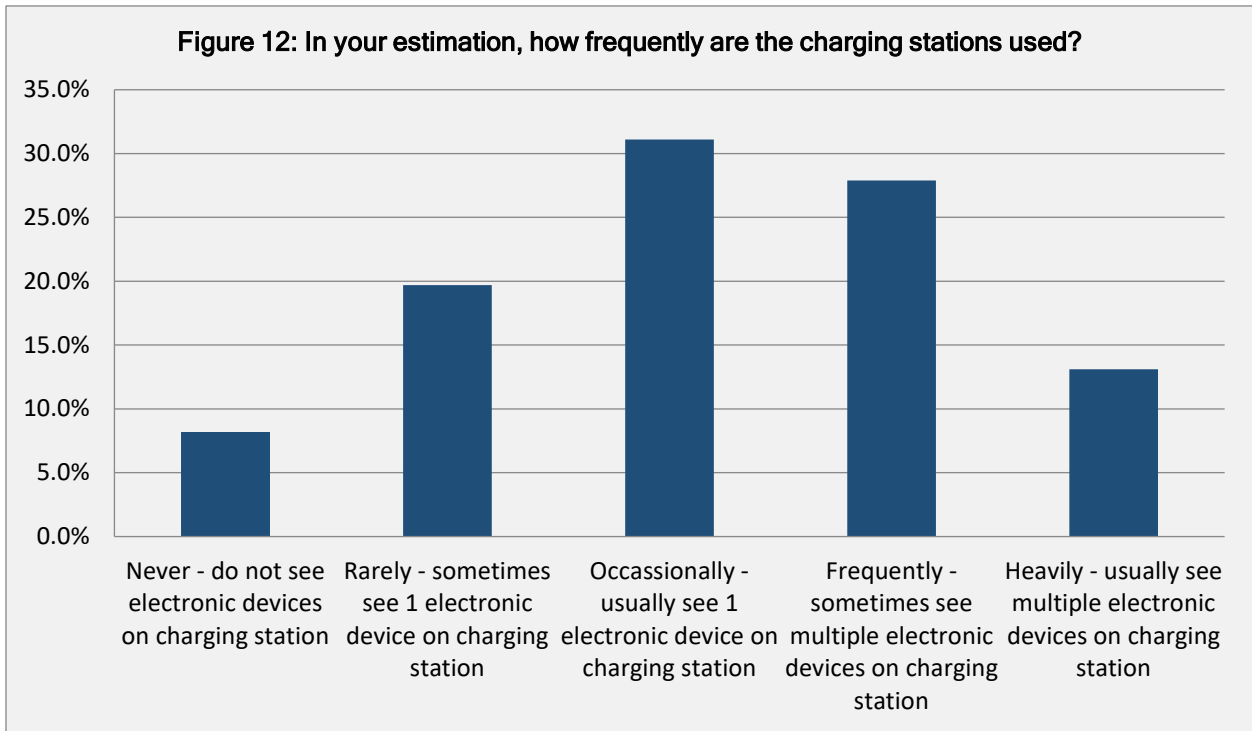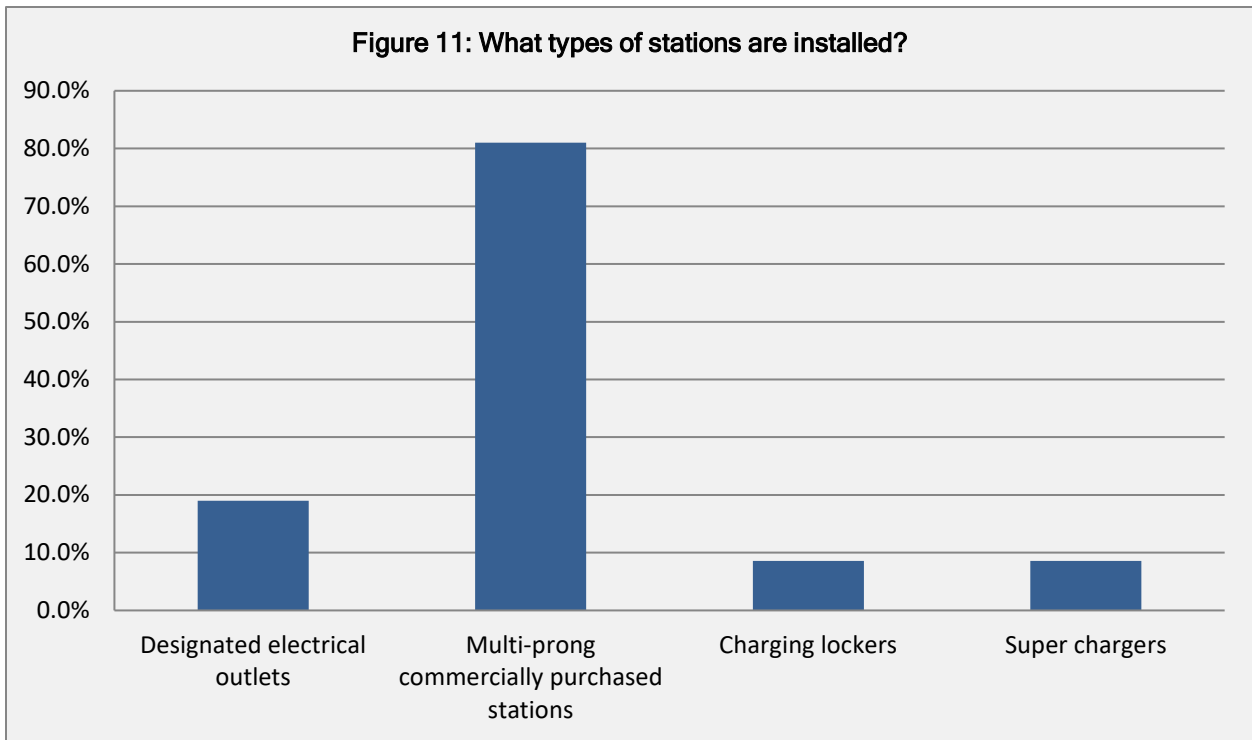
Limits

This survey includes several potential limitations. Initially, the question regarding institution name was included so that duplicates could be removed. Institution name proved to be unreliable as many respondents chose not to provide a usable answer (e.g., typed in characters rather than a name). This meant that duplicates could not be determined and therefore could not be removed. Another potential limitation was that some of the questions assumed that the respondent was aware of what was happening at an institutional level. This may account for the percentage of answers that were "not sure." Some of the question results were not included in the final results as the answers proved to be either insufficient or too broad. Examples include questions that asked how many charging stations were at the institution and how many charging stations were in the library. If this survey were to be repeated, questions with unreported results would be rephrased to eliminate interpretation errors.

Discussion

While the purpose of this study was to determine the presence and use of charging stations for electronic devices in academic libraries, of particular interest were the institutions that provide and/or require their students to have electronic devices. The responses from the 28 percent (73) respondents whose institutions require and/or provide electronic devices (see Figure 4) were examined to determine if there was a trend by institution size. These institutions can be divided into two groups: those that do provide charging stations and those that do not provide charging stations but see a need for them.

Of the 28 percent (73) of respondents whose institutions require and/or provide electronic devices, 59 percent (43) do not provide charging stations. Of those that do not provide charging stations, 67 percent (29) see a need for them. The 67 percent are distributed among the different size of institutions as follows: very large (>30,000): 10 percent (3), large (15,001-30,000):28 percent (8), medium (5,001-15,000): 24 percent (7), and small (<5,000): 38 percent (11). This demonstrates that more than half of the institutions that are requiring and/or providing electronic devices are not meeting their student needs by providing charging stations, but, of these, two thirds see a need for them.

Of the 28 percent (73) of respondents whose institutions require and/or provide electronic devices, 32 percent (23) provide charging stations. Georgia State University, a very large institution, falls into this category as it provides and/or requires electronic devices and provides charging stations. The institutions that require and/or provide electronic devices and also provide charging stations are fairly equally distributed among size of institution: very large (>30,000): 26.1 percent (6), large (15,001-30,000): 26.1 percent (6), medium (5,001-15,000): 30.4 percent (7), and small (<5,000): 17.4 percent (4). This demonstrates that only a third of the institutions that are requiring and/or providing electronic devices are meeting their student needs by providing charging stations, and that this is fairly equal across institution size.

Conclusion

The survey findings reveal that, at that time, there was a disparity between users' need to charge electronic devices and institutional resources. More specifically, there was an unmet demand for designated charging stations for electronic devices (laptops, tablets, iPads, etc.). Libraries are in an ideal position to provide increased access to library resources and research materials by providing charging stations for electronic devices. This survey's findings indicate that, while many institutions do not provide charging stations, they are realizing the need for them. Those that do provide charging stations see them as effective

and note that they are frequently used. These findings indicate that charging stations are a resource that institutions should consider when renovating spaces.

This exploratory study has identified several areas for further research such as: actual frequency of student usage of charging stations, polling of students on the use of charging stations and preference of charging station type, and usage and/or preference for electrical outlets or charging stations. Research in these areas would provide information for institutions considering providing this resource to students

as new spaces are planned or renovated. Several survey comments mentioned this survey as an inspiration for purchasing charging stations for their library. It is hoped that this project helps libraries meet student needs through the installation of designated charging stations.

Initial results originally presented at the GaCOMO 2013 annual conference.

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Appendix A

Note: The survey consisted of 21 questions with each answer determining the next question; no one respondent answered all of the questions in the survey and respondents could choose not to answer a question. For example, for question 7, if a respondent answered "yes" they were skipped to question 8, if they answered "no" they were skipped to question 9, and if they answered "not sure" they were skipped to question 9.

Georgia State University
University Library
Informed Consent

Title: Charging Station Survey
Principal Investigator: Lesley Mackie

I. Purpose:
You are invited to participate in a research study. This research project is a survey on the presence and use of charging stations for electronic devices in academic libraries. You are invited to participate because you are working in an academic library. Participation will require less than 10 minutes of your time.

II. Procedures:
If you decide to participate, you will be completing an online survey. The research will be done at Georgia State University and will require less than 10 minutes of your time. There will be no compensation.

III. Risks:
In this study, you will not have any more risks than you would in a normal day of life.

IV. Benefits:
Participation in this study may not benefit you personally. Overall, we hope to gain information about the use of charging stations in academic libraries.

V. Voluntary Participation and Withdrawal:
Participation in research is voluntary. You do not have to be in this study. If you decide to be in the study and change your mind, you have the right to drop out at any time. You may skip questions or stop participating at any time. Whatever you decide, you will not lose any benefits to which you are otherwise entitled.

VI. Confidentiality:
We will keep your records private to the extent allowed by law. Lesley Mackie will have access to the information you provide. Information may also be shared with those who make sure the study is done correctly (GSU Institutional Review Board, the Office for Human Research Protection (OHRP)). The information you provide will be stored online secured behind a password, however, information sent via the Internet may not be secure. Your name and other facts that might point to you will not appear when we present this study or publish its results. Institution names will be used to determine duplication of responses and may appear in publication of results. You will not be identified personally.

VII. Contact Persons:
Contact Lesley Mackie at 404-413-2738 or lmackie@gsu.edu if you have questions, concerns, or complaints about this study. You can also call if think you have been harmed by the study. Call Susan Vogtner in the Georgia State University Office of Research Integrity at 404-413-3513 or svogtner1@gsu.edu if you want to talk to someone who is not part of the study team. You can talk about questions, concerns, offer input, obtain information, or suggestions about the study. You can also call Susan Vogtner if you have questions or concerns about your rights in this study.

VIII. Consent:
You can print a copy of the form for your records. If you agree to participate in this research, please continue with the survey.

1. To:
   o Continue to survey
   o Exit

For clarification while completing this survey:
- Electronic devices refers to phones, iPhones, laptops, tablets, etc.
- Charging stations are designated locations for students to use to charge their electronic devices.

2. Name of your institution:
   o Size of your institution:
   o Small (<5,000 students)
   o Medium (5,001-15,000 students)
   o Large (15,001-30,000 students)
   o Very Large (>30,000 students)

3. Instructional level of your institution:

   o Bachelor degree programs
   o Master degree programs
   o Doctoral degree programs

4. Other (please specify)

5. Type of institution:

   o Private
   o Public

Other (please specify)

6. Number of libraries at your institution:

7. Does your institution require students to have or provide students with electronic devices (laptops, ipads, tablets, etc.) for any degrees or programs?

o   Yes
o   No
o   Not sure

8.   What electronic devices are required and/or provided?

	Required	Provided
Laptops	O	O
iPads	O	O
Tablets	O	O
Other	O	O

Other (please specify)

9.   Does your institution provide designated charging stations, not simply electrical outlets, for electronic devices?

o   Yes
o   No
o   Not sure

10. Do you see a need for charging stations at your institution?

o   Yes
o   No
o   Not sure

11. Is your institution considering installing charging stations?

o   Yes
o   No
o   Not sure

12. What is the installation time frame?

o   <1 year
o   >1 year
o   >2 years

13. Is your institution facing any restrictions to the installation of charging stations? (i.e. cost, electrical)

o   Yes
o   No
o   Not sure

Installation restrictions:

14. How many charging stations are there currently at your institution?

15. How many charging stations are currently in the library? (if you have multiple libraries provide a total number)

16. What types of stations are installed? Select all that apply.

    o   Designated electrical outlets
    o   Multi-prong commercially purchased stations
    o   Charging lockers
    o   Super chargers
Other (please specify)

17. Is this type of charging station effective or would you change?

18. In your estimation, how frequently are the charging stations used?

    o   Never - do not see electronic devices on charging station
    o   Rarely - sometimes see 1 electronic device on charging station
    o   Occasionally - usually see 1 electronic device on charging station
    o   Frequently - sometimes see multiple electronic devices on charging station
    o   Heavily - usually see multiple electronic devices on charging station

19. Do your charging stations have logos on them?

    o   Yes
    o   No

20. Who is the sponsor?

    o   Institution
    o   Commercial sponsor

Other (please specify)

21. Comments?