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Editor's Note: This simple practical study makes sense wherever technology is used for teaching and learning. It shows no significant difference in attitude towards technology or use of technology among males and females. It did not identify any specific problems in use or support for learning technologies by the university. It did show a level of comfort for the way technology is used by faculty and students.

A study of undergraduate students' use of educational technologies

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Abstract

A qualitative study was conducted to investigate the use of technology by undergraduate students at a large public research university. Forty student interviews were conducted, 20 female students and 20 male students. Students were asked questions about their technology usage, such as: "How do you use technology for academic purposes," "What kinds of technological devices do you use," "What software and applications do you use?" Students' were also asked questions about the usage of technology in classrooms and the university's technology resources. The findings of this study indicate that a variety of commonly available technological tools such as email, web browsers, presentation software, learning management systems, and the internet are being used by undergraduate students and their instructors. Such usage is prevalent both inside and outside the classroom. Somewhat more specialized tools are used in different disciplines. Based on the findings of the study, the authors identify a similarity between a "gear" and technology use by faculty members and students.

Introduction

Colleges and universities in the US spend billions of dollars on educational technology every year. According to one estimate, in the year 2015, "U.S. Higher education institutions [were] expected to spend about \$6.6 billion on IT" (IDC Research Inc., 2015). In many universities, students are also charged technology fees when they register for courses. Technology fees generate additional funding for universities, and such fees are generally used to upgrade and improve networks, hardware and software, and equip computer labs and smart classrooms (Mallette, 2002). As the technological landscape continues to change, newer technologies will compete for their share of the technology fee funds every year.

A question that comes to mind is whether such lavish spending is reflected in the use of technology on campus by students and faculty both inside and outside of the classrooms?

Purpose of the study

The purpose of this inductive qualitative study was to investigate:

- What kinds of technologies undergraduate students use to complete their course related work?
- What technologies do course instructors use?
- How aware are undergraduate students about the technological resources that are available for their use on campus?

In the section of the paper where the findings of this study are discussed, such findings will be related to the findings of other studies regarding the use of technologies for educational purposes.

The pilot study

After obtaining approval from the university's Institutional Review Board (IRB), seven undergraduate students were interviewed initially. Teijlingen and Hundley (2001) discuss many reasons why pilot studies should be conducted. The purpose for conducting this set of pilot interviews was to hone the interviewing skills of the researchers. During the pilot phase of the study the interviewers became comfortable with the idea of approaching students and asking them to participate in the study and be interviewed. The pilot study helped the interviewers to test the digital audio-recorder and become knowledgeable about how to use the recorder. The pilot study also helped the interviewers learn how and when to ask appropriate follow-up questions. As a result of the pilot, the interviewers learned that it was better to interview participants individually rather in small groups. The interviewers also learned that having a co-interviewer helped with the interview process, especially when it was time to ask follow-up questions.

Finally the pilot study also taught the researchers that they need to ask follow-up questions about the participants' majors. Participants in the pilot study did not divulge such information until a follow-up question regarding their majors was asked. The students who were interviewed during this pilot study were not included in the larger study.

Setting for the study

The study was conducted at a large public research university with an international charter. Located in the State of Florida, the university enrolls a diverse international student population. As of the Fall 2015 semester, about 54,000 students attended the university. Of this number over 39,000 were undergraduates. The remaining students are graduate students in different disciplines and professions.

Selection of study participants

Participants for the study were selected using a variation of the "mall-intercept" technique. Instead of approaching participants outside a shopping mall, the researchers approached undergraduate students outside the busy library on campus. The library is a building where students from diverse disciplines tend to visit and study. They also walk past the library to go from one class to another, to go to the student center building that offers a variety of food options, or to go to parking lots where they parked their cars. For these reasons, this location was selected as being an appropriate location for soliciting participation in the research study.

Potential participants were approached and asked if they would be willing to take part in the study. If participants consented to participate in the study, they were asked a series of questions and the interviews were audio recorded. The Institutional Review Board (IRB) approval memo and the verbal consent statement were shared with the participants before the start of the interviews. Using this approach, forty undergraduate students, twenty males and twenty females, were selected to participate in the study. The sample of participants constituted a sample of convenience.

The interview questions

The interviews were based on the following questions that were approved by the IRB:

- How do you use technology for academic purposes?
 - What devices do you use?
 - What programs do you use?
 - How do you use it, what do you do with it?
 - Where do you use it?

- Do any of your instructors use technology in class?
 - Which subject, what course?
 - How do they use it in the classroom?
 - Do they make you use it? How?
- Do you use technology resources provided by the university?
 - What resources do you use?
 - How do you use them (what purposes)?

Based on responses provided to the above approved questions, appropriate follow-up questions were asked by the interviewers. The purpose of asking follow-up questions was to clarify responses provided and also to encourage participants to elaborate on their responses.

Analysis of the data

All interviews conducted for this study were audiotaped. The researchers listened to the audiotaped interviews at least two times. Each audio taped interview was listened to by two researchers. Because the value of transcribing every word of audiotaped interviews has been questioned (Halcomb and Davidson, 2006) and because such transcription would not really have been useful for the purposes of this study, the researchers instead used the technique of listening to the audiotaped interviews.

Biklen and Bogden (1986) “recommend a two-step process” (p. 99) for coding text-based data. In this study the researchers listened to the audio taped interviews at least two times. After listening to each interview each researcher independently coded information about the devices and software applications that were mentioned by the interview participants. The researchers were primarily interested in identifying information that related to the purposes of the study and coded instances of the audiotaped data that related to the purpose of the study. The data coding was closely aligned to the purpose of the study.

Findings of the study

Devices used (both male and female students)

Information based on interviews of the twenty male and twenty female undergraduate students indicates that many devices were used in the courses that they completed. The devices that were mostly used included desktop computers, laptops, tablets, and smartphones. One of the male students mentioned that he used a gaming console to search the web for educational purposes.

The data collected for this suggest that there were no major differences among males and females in terms of devices that they used for academic purposes.

One of the participants, based on her knowledge of what is done in another university, offered the suggestion that students should be allowed to print “a certain number of pages per day” without having to pay printing charges. This suggestion makes sense because the university is already charging all students a technology fee every semester. Why should students have to pay for printing work related to their courses?

Software applications used for academic purposes (male and female students)

In this study a majority of the forty male and female students reported using more commonly available software tools such as Microsoft Word and PowerPoint, Email, web browsers and a learning management system that is widely used in the university.

The researchers inferred that all students used web browsers, because all of them reported that they used web-based services or resources. Their reported web activity included using email, the Blackboard Learning Management System (LMS).

YouTube, Chegg, Evernote, iConcentrate, BibMe, Quizlet, iBooks, Moodle, Notability, Khan Academy, Mathway, Course Hero, Prezi, StudyRoom, Dropbox, Wikipedia and Google Scholar and a few other software tools were reportedly used to a lesser extent.

The data shows that a majority of the students used technology to search for information and to do research using the web-based resources mentioned earlier.

Other uses of technology for academic purposes included taking notes, working on assignments, checking email, watching videos reading online content to understand concepts covered in courses.

Students also used the Blackboard online Learning Management System (LMS) to submit course related assignments.

No discernable differences were found between men and women regarding the use of technological tools.

Technologies used by course instructors (according to male and female students)

The use of projectors to present PowerPoint slides was mentioned by a number of students. iClickers (Interactive Response Systems) were also used by instructors. According to the participants, some of the instructors used videos in their classes. Online videoconferencing using Adobe Connect was another technology that was mentioned during the interviews. At least one instructor used her own personal website in her course. Another used NetBeans to help his students develop programming skills.

A male student stated, "I think no professors nowadays use a blackboard, I haven't seen a professor use a marker in like two semesters at least." When asked a follow-up question regarding the use of technologies in classes by students, the same participant said:

I want to say yes, because, every aspect of life that integrates technology, in somehow, it gets better or easier or more efficient I just don't have any ideas right now on how integrating technology in education in the t would make it better.

In response to a follow-up question about the amount of technology professors at the university use in their classes, one of the male participants said

"I feel like it's a good balance because you don't want to be in a completely tech-involved class...because maybe that is not the right fit for some people. Some people like to have textbook and paper and notebook instead of like typing and clicking."

One student in particular felt that sometimes professors use too much technology in the class. He indicated that using too much technology results in students having to learn the content by themselves instead of the professor teaching the content to the students.

Use of university resources (both males and females)

Students were also asked question about their use of technology resources available at and provided by the university.

Based on students' responses to this question, it can be concluded that they do use a number resources available at the university, such as computers and printers in computer labs, databases and other online resources that are available through the library website, and free Microsoft Office packages that the university provides for its students. Some students also borrow tablets, laptops and headphones.

Only one female participant stated, “I’m not really sure what resources are available, I’ve used the library once or twice but I honestly have my own devices to use.”

Discussion of the Findings

Technology use by students and faculty is limited to a few tools

One of the findings of this study is that a majority of the students used a course or learning management system (CMS or LMS) for work related to their courses. This finding is supported by a study by Smith and Caruso (2010) who found that more than 90% of the students who participated in their study reported using a CMS.

A majority of the students in this study reported using a limited number of widely available software applications such as email, browsers, word processors, and presentation software. Imhof, Vollmeyer, and Beierlein (2007) reported similar findings regarding most commonly used applications: “For study-related computer activities, university students use word processing, email and Internet searches most frequently” (p. 2830). The use of a restricted set of technological tools by students has also been reported by Bullen, Morgan, and Quayyum (2011).

Most of the students who were interviewed in this study stated that faculty members also used readily available tools such as Power Point and Projectors. Based on the findings of his study, Selwyn (2007) also came to the conclusion: “Despite huge efforts to position information and communication technology (ICT) as a central tenet of university teaching and learning, the fact remains that many university students and faculty make only limited formal academic use of computer technology” (p. 83).

Differences in technology use by men and women not discernable

The researchers did not find any noticeable differences in technology use by men and women. This suggests that women are using technological tools as much as men. Both men and women in this study reported using tools such as browsers, email, course management systems and word processors for educational purposes. Such a finding is supported by Haywood et al (nd) who found that “Gender effects are small and generally declining” (np). Similar results have been reported by Bain and Rice (2006) who stated that “One of the major findings of the study was that gender differences in attitudes, perceptions, and uses of computers were not found to be significant” (p. 128). Lewis, Coursol and Khan (2001) have also reported findings that show no significant differences between men and women in the use of email and internet technologies for course related activities. This study also found no noticeable difference between men and women in the use of various devices such as desktop computers, laptop computers, tablets and smartphones.

Students do make use of resources provided by the university

Nearly all the students who were interviewed indicated that they used the resources that the university makes available for their use. Such resources included computers and printers in labs and also borrowing equipment from the library. Only one of the students who participated in the study stated that she was not aware of the resources provided by the university. She also mentioned that she owned the technological devices that she needed and used them.

A “Gear” analogy of technology use

Based on the findings of this study technology use can be likened to a “gear”, which has a central part and a number of teeth on the edges. The primary technologies used such as Web browsers, email, PowerPoint and Word can be likened to the central part of a gear as shown in Figure 1. The central part of the gear represents the most widely used technologies while the teeth represent tools that are generally used in different disciplines. Some of the technologies are more

commonly used probably because the university makes them available to all students and faculty across all disciplines. Perhaps such technologies are also more appropriate for such wide ranging use because they meet the educational needs of most students and faculty.

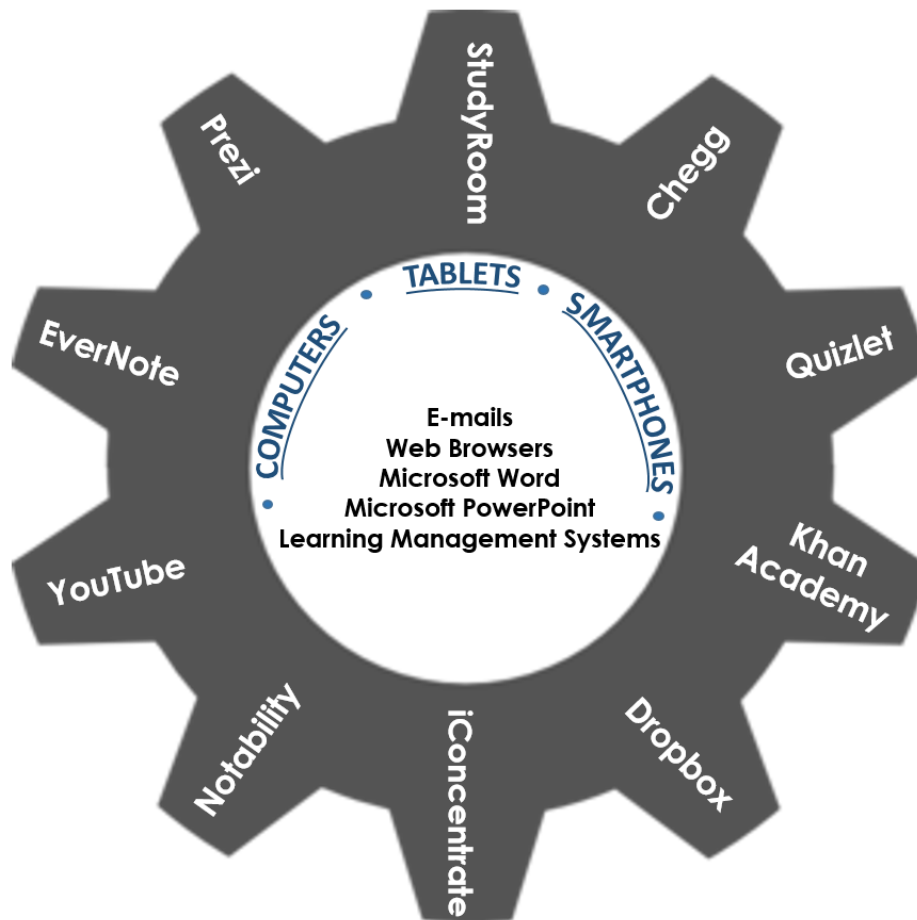


Figure 1. A “gear” analogy of technology use.

(NOTE: The public domain gear image in Figure 1 was obtained from <http://www.clker.com/>)

Conclusion

The major finding of this study was that students and faculty members at the higher education institution are using various technologies for educational purposes. Technologies do change and funds spent on technological tools are likely to increase in future years. These two factors necessitate continued research on how students and faculty members use technologies for educational purposes. Future studies that use different methods and incorporate larger samples of participants are likely to yield more insights into technology use for educational purposes by faculty and students.

The researchers also propose a “Gear” analogy of technology use. The model suggests that most faculty and students use similar and commonly available technological tools. Such usage is represented by the central part of the gear. The use of specialized tools that take place in different disciplines is represented by the teeth of the gear. It will be interesting to see if this model of technology use changes over time.

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About the authors

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Elizabeth LaMacchia began her career in Education as a 3rd grade teacher in 2012. She currently holds a bachelor's degree in Elementary Education and in 2016 graduated with her master's degree in Curriculum and Instruction with an emphasis in Learning Technologies from Florida International University. In addition to being flexible and dedicated, she seeks new endeavors and challenges to continue her pursuit of knowledge. She has attended numerous educational trainings and continually seeks out various professional development opportunities to further enhance her understanding of using technology in academic settings.

Stephanie Reynolds is a graduate student at FIU. She is currently working on her master's in Curriculum and Instruction with a focus on Learning Technologies. She has a bachelor's degree in elementary education and has been a teacher now for three years. She is currently teaching second grade math and science. Stephanie enjoys reading up on the newest and latest educational technologies and implementing these new tools and strategies into her classroom.

Fiorella Tovar earned her master's degree from Florida International University and her bachelor's degree from the University of Central Florida. She is currently a third grade teacher working for Miami-Dade County Public Schools. Her passion for technology has greatly impacted her teaching practices as well as the students in her classroom.

[Return to Table of Contents](#)