Fall 11-17-2014

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ABSTRACT

A qualitative research study was conducted and data were collected by interviewing university professors on their perceptions about the impact of integrating Google Apps, as a means of classroom instructional delivery, on students' communication and collaboration skills. The participants consisted of eight university professors from a major university, who integrate, or had previously integrated at least two Google Apps Education Edition collaborative tools into their instructional strategies. The result of this study has the potential to benefit universities that are debating on whether utilizing teaching collaborative technology skills, as an instruction tool, would engage students and enhance their communication skills. Results found that professors would consider integrating Google Applications into their instructional strategies, if given the appropriate professional development and training. Professors agreed that collaborative technology was an effective teaching tool and assisted students when working on group and individual projects. One interpretation from the interviews from the university professors suggested that utilizing collaborative technology in higher education helped to improve students' communication and collaborative skills, and improved students' perceptions and knowledge of technology use in the classroom.

Keywords: Google Apps, collaboration, higher education, e-learning, 21st century learning, online learning, education technology

Introduction

Research shows that many businesses are unhappy with newly hired employees due to their lack of collaboration skills after graduating from college. Over 90% of executives stated that collaboration and communication were extremely important skills that that college graduates need to be successful in the workplace (Eisner, 2010). In addition, many businesses would prefer employees to have above average skills and possess the capabilities of collaborating in face-to-face environments and virtual settings. The benefit of having students participate in collaborative assignments is to develop their communication and collaboration skills (Nickels, Parris, Gossett, & Alexander, 2009). With so many companies having virtual teams in the 21st century, the need for communication and collaborative skills will continue to grow. The virtual

environment in the workplace has increased drastically over the past decade with major companies partially or fully eliminating physical traditional offices (Mulki, Bardhi, Lassk, & Nanavaty-Dahl, 2009).

The issue for most university professors is teaching technology skills in classes where technology is not the focus; however, it is essential to incorporate technology in course content (Llorens, Bayona, Gomez, & Sanguino, 2010). Professors who do not have time or space within the current curriculum to add new courses should incorporate technology skills within existing courses. Information and communication technologies appear unstoppable, and therefore, education cannot continue to move forward with an outdated model (Llorens et al., 2010). Teaching integrated lessons is effective, but requires professors to possess advanced technology skills. A solution is to integrate core content lessons with technical collaboration, so students can practice collaboration in virtual environments while simultaneously learning course content. Lastly, many universities lack funds to purchase additional technology; thus, there is a need to find funding or free tools (Fox, 2007). Google Apps for Education is suitable to addressing the current technology needs in higher education.

The purpose of this study was to examine university professors' perceptions of the advantages and disadvantages of teaching using collaboration with Google Apps for Education. Hunt, Smith, and Chen (2010) stated that academicians need to challenge students to engage, and one way to accomplish this is by using active collaborative teaching scenarios. In doing so, students have the opportunity to practice and master content through the use of collaborative technology tools being integrated into their classroom engagement.   Patton (2008) reported that sharing information with students was one of the main objectives of any course, and students needed a vehicle in which to accomplish this outcome. Whittaker (2009) maintained that speed and collaboration are pertinent, and Google Apps allowed both concepts.   Rienzo and Han (2009) agreed that collaboration is a major focal point for corporate America. DiBlasi (2010) stated that educators must provide students with technology tools and skills such as collaboration and communication for them to be successful in future work environments.

Collaboration

Collaboration and the concept of open discussion are considered high priorities (Stone, 2008). Kop and Hill (2008) agreed that the beginning point for learning occurred when knowledge was shared with other connected learners, so collaboration and communication are pertinent. Collaborative learning is an instructional approach where learners interact, share knowledge, and share skills to attain a specific learning goal (So & Brush, 2007). Students who work together learn from each other and this increased interaction and learning extends beyond the classroom (Mncube-Barnes, 2010). Learning from others is crucial as collaboration increases the possibility that students will store the learned information in their long-term memory. The average amount of information retained from discussions is 50%; practice by doing is 75%, and teaching others or using new information immediately is 90% (*Teaching with the Constructivist Learning Theory,* n.d.). Participating in activities that promote greater learner retention also helps students become accustomed to communicating and collaborating with others. DiBlasi (2010) asserted that students should learn from their peers in the classroom and across the globe, so they are active participants in their own learning. To accomplish these goals, students must work collaboratively utilizing 21st century technology.

Wheeler and Waggener (2009) explained that for research focused universities, it is a necessity to collaborate on national and global levels. Collaboration among students,

researchers, degree programs, and administrative services is vital to economics and drives innovation and is the new normal (Wheeler & Waggener, 2009). In the future, collaboration will focus on constructing and sustaining communities by concentrating on content, tasks, and ideas (Erickson, Rhodes, Spence, Banks, Rutherford, & Simpson, 2009). Therefore, higher education settings must shift priorities and prepare students with the skills for future professional positions; granting opportunities for students to interact, reflect, exchange ideas, and acknowledge experiences of the content, and the ability to articulate well with others (Mncube-Barnes, 2010). Providing further support, a survey was conducted with over 400 human resource and senior executives who rated the top 20 workplace-related skills, and the results found that oral communication and collaboration were the skills rated as most vital in the workplace (Jerald, 2009). In another study, employers ranked collaboration as the second most important skill; professionalism was first for applicants (Jerald, 2009). Effective collaboration often requires multiple facets of communication, and Google Apps offers tools to apply communication skills when meeting within a cloud.

Kieser and Golden (2009) found that teaching students to collaborate in virtual and traditional environments, improved students': (a) critical thinking skills, (b) discussion and consideration of ideas, and (c) social skills development. Havard, Du, and Xu (2008) explained certain students feel more at ease and participate actively with asynchronous collaboration as compared to face-to-face collaboration. The reason for the relaxation was due to students not having time restrictions, competition, or interruptions. Individuals can use online synchronous meetings to collaborate; although one cannot replicate the subtlety, humor, energy, and excitement of a face-to-face meeting (Patton, 2008). Patton found synchronous meetings captured more than asynchronous communication. So and Brush (2007) found a positive correlation between social presence and collaborative learning, and they felt it vital to observe the feeling of the connectedness among students. Collaboration among staff is also pertinent for educators to become more effective and for students to feel connected. Horn (2008) found that roadblocks often existed with online professional development and suggested that professors utilization of various tools is one method to accomplish professional development skills without having to schedule a meeting time or a location, in other words, allowing for flexibility for professional development activities.

Communication

Sharing ideas is a form of collaboration that is accomplished through means of communication, for example, verbal or written formats in face-to-face or distance environments. Instructing students how to communicate in both formats and environments is essential for success. Communication tends to be undervalued and not taught; although everything drives effective communication (Denny, 2006). Operative communication is an important and required skill which is also overlooked in the educational environment, even though students are not well prepared to communicate thoughts and ideas, despite the fact that effective communication is a requirement in a global society (Denny, 2006). There are numerous benefits to effective communication including learning; Allison (2007) stated that sharing experiences creates an additional dimension of how the brain relates knowledge to other known facts, figures, and concepts.

Teaching students how to communicate includes instruction on how to share expertise. Knowing how to convey knowledge is pertinent or the insight being conveyed becomes worthless (Denny, 2006). Students must learn how to share information in an understandable

format, however, many students struggle to articulate clearly and concisely, and it is difficult for many to find focus, energy, and passion around the concepts of communication (Jerald, 2009). Once basic concepts are taught and practiced, more advanced lessons can include information on how to improve communication. There are techniques for improving communication skills; such as, the art of listening and increasing or decreasing the speed of the conversation (Staff Reporter, 2008). These skills benefit students when they transition into the workplace.

Communication can be a major factor in how a situation is managed, and poor communication will eventually lead to a negative outcome; while effective communication most likely leads to a positive outcome (Denny, 2006). For businesses, the price of poor communication can be astonishing, such as : (a) loss of time, (b) loss of respect, (c) loss of business, (d) loss of money, (e) loss of confidence, (f) loss of credibility, (g) loss of relationships, (h) loss of staff, (i) loss of trust, and (j) loss of clients (Denny, 2006). These issues are large prices to pay and could result in massive consequences for the employee. Ineffective communication with group participants is one of the main challenges of online collaboration (Thompson & Ku, 2006). Virtual communication is a considerable issue, since collaborating from afar is often necessary to complete a group project. Seamless conversation is a necessity, since computers cannot communicate for people. Computers cannot replace complex formats of communication due to the fact that technical tools are incapable of interpreting information within context (Jerald, 2009). This concept was supported in a case study of 12 graduate students enrolled in an online instructional design course over a 16-week semester (Thompson & Ku, 2006). Educational institutions would benefit from having additional research studies regarding the importance of how students communicate in higher education and the need for such skills in the workplace.

Collaborative Technology

Organizing individuals into a virtual environment is an option where everyone can participate, allowing a group with social interactions similar to face-to- face meetings (Allison, 2007). The researcher stated that distance was no longer a limitation for sharing ideas, best practices, and &experiences. Finholt (2009) suggested a valuable facet of collaborative technology to engage participants in an activity, regardless to distance. Utilizing collaborative technology is a necessity for virtual teams and the overall benefit is the space for storage of common information and a repository to develop and share work in-progress (Bjorn & Ngwenyama, 2008). Virtual space to collaborate is critical. Learning occurs within: (a) open discussions, (b) idea exchanges, (c) opinion sharing, (d) knowledge distribution, and (e) active participation (Su & Beaumont, 2010). According to Bjorn and Ngwenyama (2008), the primary idea behind transparency with collaborative technologies is to help people prevent and recover from communication breakdowns.

Email is considered collaborative technology; however, it does not provide a shared workspace (Bjorn and Ngwenyama, 2008). Professionals claim that instructional technology often has more issues with virtualization than with benefits (Duffy, 2009). This is also an issue with tools used without mutual accountability, because without mutual accountability, there is an increased risk for communication breakdowns. Collaborative technology options that include mutual accountability are: (a) Google Docs, (b) Google Sites, or (c) wikis. Google Docs and Google Sites create a shared workspace where everyone is held accountable and able to communicate and collaborate in one space. Su and Beaumont (2010) explained that a wiki is a website that can be edited by the individuals who visit the site, so it allows for pages to be easily

created and edited collaboratively. Further, such technology improves virtual collaboration and is an asset to learning in the 21st century (Su and Beaumont, 2010). Most of the research conducted in the area of online collaboration has focused on strategies promoting distance collaboration and communication rather than focusing on utilizing collaborative technology for group work as an instructional strategy (Thompson & Ku, 2006).

Collaborating within the online environment requires everyone to have solid written communication skills (Havard et al., 2008). Issues arise when any team members have weak writing skills, however, when students work in a shared workspace, students who are stronger in an area can edit the work of their peers who struggle with written communication. Virtual collaboration assists students with: (a) accomplishing higher level skills, (b) decreasing the desire to procrastinate, and (c) gathering various perspectives and explanations (Thompson & Ku, 2006). Collaborative technology encourages team work and helps students learn how to utilize virtual collaboration for future careers. Mncube-Barnes (2010) explained that collaboration tools allow users to partake in real-time lessons and discussions in order to complete a collaborative project or report. This strategy allows for more freedom of time and location, and collaborative technology is essential for effective collaborative virtual meetings and projects.

Need for Technical Collaboration Skills

Blaskovich (2008) stated that the 21stcentury business environment is global and relies on employees having advanced technical collaboration and communication skills. Blaskovich further explained that a number of businesses utilized virtual collaboration to: (a) connect workers, (b) reduce costs, (c) decrease travel, and (d) improve productivity. Many businesses have stated that graduates should have technical collaboration skills to utilize immediately upon being hired.

Bjorn and Ngwenyama (2008) asserted that communication is a part of collaboration and is the ability to negotiate and communicate with others. Remote managers and employees have noted success when communicating and collaborating with team members who reside in different geographically locations. Organizations that are spread across the world, consisting of individuals from varying cultures and languages, have found great results from bring people together to collaborate on specific tasks (Bjorn & Ngwenyama, 2008). Bjorn and Ngwenyama also stated that virtual teams must prioritize the challenge of: (a) managing collaboration, (b) developing a mutual meaning of contexts and common language, and (c) necessitating solid writing communication competences for all individuals involved (Havard et al., 2008). The benefit of meeting through collaborative technology surpasses most downfalls (Hunt et al., 2009).

When entering the workforce, many report a weakness in the area of technological skills (Mncube-Barnes, 2010). The possibility of negative effects from collaborative technology tends to decrease with experience and adaptation (Wakefield, Leidner, & Garrison, 2008). Thus, utilizing collaborative technology is considered a 21st century skill expectation. Virtual teams have increased at such a rapid pace that over half of all professional employees have worked on some type of online collaboration to better prepare students for future employment where employees may be required to participate on a virtual team (Thompson & Ku, 2006). Virtual teams that utilize technology-mediated communication are less likely to experience: (a) task conflicts, (b) relational conflicts, and (c) process conflicts.

Google Apps Education Edition

Google Applications Education Edition is a suite of tools that iscost effective to schools and functions in a cloud allowing educational institutions to have the ability to securely communicate and collaborate from any web browser without needing additional servers, software, or maintenance (Google, 2009). This suite of tools was first introduced in October 2006 (Borja, 2006). Nevin (2009) stated that Google Apps had the most well-known applications available within the cloud which includes: (a) word processing, (b) spreadsheet, and (c) presentation software; the only additional necessity is Internet access. Google Applications focuses on collaboration, communication, and organization. When individuals collaborate with others it incorporates several of the learning intelligences, such as: (a) verbalized learning; (b) re-evaluated feedback; (c) applied knowledge to different situations; and (d) created mental connections between facts, concepts, and skills (Allison, 2007). The collaboration process helps students to more effectively learn the information. Cloud computing allows students and professors to communicate and collaborate from any device that has access to the Internet, including many cell phones (Nevin, 2009). This empowers all students and professors who are participating to communicate and collaborate at their convenience. With Google Applications, all of these negative scenarios are eliminated and saves students and professors a considerable amount of time and stress.

Nevin (2009) stated that professors who collaborated with their students as they worked on assignments reported greater success in sharing documents and the ability to provide feedback throughout the process rather than waiting until the final product was submitted. Utilizing Google Docs is an excellent method to create teacher project pages, which can be published on webpages and linked to a website (Koval, 2009). Lastly, since students can collaborate in real-time as changes are being made and the revisions are recorded with the individual's name, there may be fewer complaints from students that a peer in the group either made poor edits or did not participate at all. Google Apps allows for more collaboration than just text with the various tools that are offered including spreadsheets, drawings, and presentations (Google, 2011). Google Apps will be including additional applications that will only improve Google Docs, which will eventually mean one can pull a picture from one application and include it in the real-time collaboration of Google Docs (Gaudin, 2010).

Higher Education Utilizing Google Applications

Numerous universities are using Google Apps Education Edition and the leading reason that colleges are switching to Google Apps is to decrease costs. Nevin (2009) maintained that Google Apps gives schools the opportunity to save significant sums of money, since Google Apps replaces the majority of other software and the physical infrastructure, such as networks and servers. Since it is vital to continue teaching with technology, schools are forced to find alternative technology that will meet the same needs at a lower cost. Antolovic, Horvath and Plympton (2009) agreed that universities must be more creative and integrative to get more accomplished, considering the current budget constraints. The first major college to switch and develop integration utilizing the Google Application Programming Interface was Arizona State University (ASU) (Fontana, 2006). When ASU changed to Google Apps, the instructional technology staff did not have to spend time patching, upgrading, and maintaining software and hardware systems that were not innovative in the area of technology (Google, 2006). Cox (2009) explained that numerous Web 2.0 tools can have a cost savings, in addition to functionality. Fischman (2008) explained that Drexel University switched to the popular email service to save

the university money, since the necessary extra storage that would otherwise need to be purchased was free with these services. Storage space for videos and other large files was an issue, giving the university little choice but to switch email providers or purchase more storage (Fischman, 2008). Boulton (2008) reported that Abilene Christian University saved money by switching to Google Apps and replaced the prior e-mail administrator position with a new developer position. This saved the school at least $100,000 a year in salaries, licensing fees, and storage and server maintenance costs (Boulton, 2008). Truitt (2009) stated that The University of Alberta was considering outsourcing e-mail to Google, which they have calculated will save over a million dollars annually with costs in salaries, hardware, licensing, and infrastructure. Reis (2008) claimed that Mount Wachusett had more modest savings, since the faculty was still using Microsoft Outlook.

Other universities switched to save money and improve functionality. Google (2006) reported that Arizona State University was spending over $350,000 a year for an email system that did not offer what free Gmail accounts provided. By switching to Gmail, the students also had access to instant messaging, calendar, and collaboration tools (Google, 2006). Ross (2009) shared that University of Minnesota converted to Google to save money and manpower, in addition to having access to numerous other programs including: (a) web-based word processing, (b) spreadsheets, (c) calendars, and (d) video channels. University of Notre Dame switched because students requested better communication functionality; and as a result, they saved one and a half million dollars, reduced calls to the campus help desk by 20%, and improved student satisfaction by 36% (Google, 2009). Forham University decreased calls to their help desk by 99% when they switched from a system that was freezing at times to Gmail (Google, 2009). Grady (2007) expressed that university students use the Google Apps collaboration tools to communicate with each other and professors in Africa. The University of Narobi has 50,000 students using Google Apps with growth projected at 150,000 students in Kenya (Grady, 2007).

Another reason universities choose to implement Google Apps is to meet the needs of their learners as they add hybrid or online options. Sani (2009) stated that Open University Malaysia (OUM) teaches utilizing a hybrid model, so they chose to implement Google Apps Education Edition. OUM uses Gmail the most, which also has the OUM logo. The university relies on: Google Talk to complement the forum function in the learning management system, Google Calendar to organize meetings, and Google Docs to house workgroups (Sani, 2009). It is ideal to utilize these tools, so that higher education institutions save money and increase teaching opportunities with the applications that are offered. With hybrid or online education, universities generally house the content within learning content management systems (LCMS). In order for LCMS to be effective for all higher education institutions, the system must offer the opportunity to collaborate, interact, and participate (Mncube-Barnes, 2010).

There are also professors within universities that choose to utilize Google Apps to work with other professors. The professors may work in the same university, but they desire to collaborate on their own time in the comfort of their home. Other professors from varying universities desire to work together. For example, Ms. Hewlett from University of San Francisco and J. J. Jacobson from JSTOR met by communicating utilizing a voice over internet protocol tool and collaborated with Google Docs as their real-time whiteboard, so they could edit as they conversed (Anonymous, 2009). Staff has a responsibility to maximize the new instructional technologies in order to offer students and faculty the possibility to learn, share, and question while working together (Mncube-Barnes, 2010).

Communication and collaboration are two skills that need to be implemented or improved in the university setting to prepare students for the workforce (Jerald, 2009). Google Apps Education Edition consists of online applications, which includes numerous tools that can assist with collaboration and communication skills and are free to schools and universities (Google, 2009). There are six core tools that are included: (a) Google Docs, (b) Google Sites, (c) Google Calendar, (d) Google Groups, (e) Gmail, and (f) Google Video (Google, 2011). Currently there are also 71 additional applications, many of which are utilized in the educational setting, but they do not have technical support from Google (Google, 2010). Some higher education institutions are switching to Google Apps to save money, and others are switching for all of the tools that are offered. Google Apps Education Edition does have some competition and downfalls; however, there currently is not a major contender in the education realm, since the service is free.

Methodology

A qualitative study was conducted to examine university professors' perceptions of the collaborative benefits of Google Apps Education Edition on students' collaboration and communication skills. The researcher conducted eight individual interviews with professors at a state university located in Arizona. This university was chosen, because it deployed Google Apps for Education in 2006 to 65,000 students (Google, 2006). The following question directed the research: What are professors' perceptions of teaching collaboration skills with Google Apps for Education? An open-ended, 10 core question, researcher-created interview protocol was administered to eight professors, who utilized a minimum of two Google Apps for Education collaborative tools in their classroom. The researcher conducted interviews via Google Voice or Google Docs in a synchronous format to allow inquiry beyond the guided questions. Interview data were coded and organized into themes and recurring patterns and the narrative date were transcribed into textual data for the purpose of deciphering data in a coherent narrative.

The interviews with the university professors occurred in their natural settings with the option of interviews being conducted over computer-mediated communication (CMC) or phone. Phone or CMC interviews are oftentimes conducted due to time, geographic location, financial constraints, or sensitive topics being covered (Opdenakker, 2006). The university professors chose to participate in the interview via Google Docs which was housed in Google Sites. During this research, no participants chose to utilize Google Voice for interviews. The interviews were recorded, so the researcher could refer to all responses. The university professors were interviewed using 10 open-ended structured interview questions designed for this study by the researcher.

A qualitative research inquiry needs to explore an argument through qualitative methods (Crescentini & Mainardi, 2009). This research format was chosen, so more in-depth data could be collected. Each interview with the university professors was individually scheduled, so that the time and data collection was convenient for the professor.

The selection criteria for the university professors who participated in the study were: (a) teaching or have taught a course that utilizes at least two collaborative Google Apps and (b) volunteered to participate. The university professors at a state university were purposefully chosen, because it was one of the first and largest universities to establish utilizing Google Apps for Education across campus. Since many of the university professors utilized Google Apps in their instruction and all students used Gmail, observers may categorize these participants as a fairly experienced group of individuals with collaborative technology.

Gall, Gall, and Borg (2007) declared that the analysis of responses to open-ended questions necessitates a category system. The initial interview questions were established and coded within themes to answer the research questions, and the answers were analyzed by fitting into coded sub-categories within each interview question. Creswell (2009) explained that basic qualitative data analysis consists of the researcher collecting qualitative data and analyzing it for themes or perspectives followed by the researcher reporting on four or five themes.

Interviews

The researcher asked ten guiding questions and included additional questions, in the event the professor's responses showed any form of resentments. Using Google Docs, the ten guiding questions were written in bold, and professors were instructed to respond within the allotted area. As the professor wrote the response, the program allowed the researcher to read the responses. When the researcher had follow-up questions, the question was typed as a note on the side of the allotted space of that particular question. After the professor answered the last question, the university professor was asked to double-check for accuracy and the researcher expressed gratitude to each university professor for extending time and for willingness to participate!

Findings

The eight university professors participated in the entire data collection process that consisted of: (a) responding to email invitation expressing interest, (b) completing online consent form, and (c) participating in a synchronous individual interview with 10 open-ended core questions that answered the overall research question: What are university professors' perceptions of teaching collaboration skills with Google Apps for Education? University professors were asked why professors utilized Google Apps Education Edition to teach collaborative technology. The following themes were generated from professors' responses: (a) accessible and free, (b) communication tools, (c) collaboration tools, and (d) not cumbersome with group.

They were asked to share the most used applications they integrated into their instruction. The following recurring themes emerged: (a) Google Docs- for the purpose of sharing information and for collaborating, (b) Calendar, Gmail, Google Docs – for the purpose of scheduling, and (c) Gmail – for the purpose of providing a communicate avenue. The university professors were asked to discuss how they were taught to use the tools, and the majority reported teaching themselves how to use the tools. They were asked their perceptions of the collaborative advantages of teaching with this specific suite of tools. The following recurring themes were generated from the university professors' responses: (a) many people can collaborate simultaneously, (b) it is web-based, and (c) students can meet virtually instead of the task of coordinating schedules.

The professors were asked to discuss their perceptions of the collaborative disadvantages of teaching with Google Apps. The following recurring themes were derived from their responses: (a) the bells and whistles are limited, (b) people need help accessing tools or instruction, and (c) the instruction is at the mercy of Google-the fear of losing information or the system going down. The professors were asked how they taught Google Apps Education Edition to students, and their responses formed the following themes: (a) they model the basics, (b) they talked students through how to use the apps, and (c) they reported not teaching students who they assumed they already knew how to use the applications or would eventually learn from the web.

The university professors were asked how students utilize tools for collaboration. The following recurring themes emerged: (a) Google Sites – students share ideas with professor through professional portfolio and students collaborate with peers with assignments and study groups, and (c) Google Docs- students share documents with professors and peers. The professors finally shared how they use the tools for the professional growth. The following themes emerged: (a) Google Docs –for presentations to groups for reflecting and for project participation, (b) Google Calendar to maintain schedules and meetings, and (c) Gmail for communicating and for submitting and feedback of student assignments.

Professor 1 stated, "I use them [Google Apps] all to some degree. I utilize Google Talk/Chat the least. I use Google Sites as a repository for students to contribute ideas for integrating technologies into content areas. This provides a large bank of ideas for all students across my 4-5 sections to access. I also use Google Sites for students to create professional portfolios of the work they have done throughout the semester. They link documents, embed videos, and create additional pages in their Google Site. With Google Docs, specifically forms, I often have my students work in small groups to discuss the current topic. I create forms for the students to submit their responses to these activities and students also create forms to get feedback on presentations. I use Google Docs the following ways: (a) students will collaborate with peers on in-class activities and complete out-of-class assignments, since I prefer that they do not send Microsoft Docs, (b) they embed their Google Docs into their portfolios, (c) I create a Google Presentation Doc to cover NET-S standards where six different groups will contribute ideas for their assigned standard. This way, the class creates one presentation with all of their ideas included for future reference, (d) I grade their major projects using a rubric within a Google Doc, which I share with the students. This keeps email to a minimum, and (e) students create reflection journals that they share with me. We are able to have an asynchronous discussion through the Google Doc."

Professor 2 claimed, "This kind of technology is integral to projects like the one I'm working on now that use resources from several different entities - including people from outside the university."

Professor 3 maintained, "I believe that the use of technology is a great tool to have in all classrooms. However, unless the resources are made available for professors to learn how to use the technology (and made user-friendly), it just makes their use intimidating and frustrating."

Professor 4 stated, "I perceive the suite to be an excellent set of tools that makes my job and my student's life easier. Students are busy and cannot always meet at the same time or location. It is the perfect solution for group projects."

Professor 6 commented, "This is a great study, more and more people should be aware of the benefits of utilizing Google Docs in classroom and work settings. It still surprises me how many people at this college, have been here for years, don't utilize the Apps, since we have direct access to them on our website."

An analysis of the professors' responses revealed that the majority taught with Google Apps, because the apps were accessible, free, and supplied collaboration tools that make group learning less cumbersome. The most popular tool they utilized for collaboration was Gmail and the second was Google Docs. The majority of the professors taught themselves how to use the tools. They believed the advantages were that it assisted numerous students with collaborating with others simultaneously and it was web-based. The greatest disadvantage was that some

individuals required special assistance accessing the tools and instructions on how to use the application.   Several professors either talked students through how to use the application, assumed students already knew how to use the applications, or the professors assumed students would teach themselves. The majority of the professors commented that students predominantly used Gmail to communicate or submit assignments and Google Docs to collaborate or present with peers. They believed that students' views of learning collaboration through collaborative technology were positive. The most common response regarding collaborative tools that students were familiar with were the tools on Blackboard such as blogs, wikis, and journals. The predominant comments from the university professors were that they needed to be taught how to use the tools effectively and several reported the need to incorporate Google Apps into their courses.

Implications

Conducting research on the advantages and disadvantages of instructing students in higher education with collaborative technology was needed to discover how higher education is preparing students, with collaboration and communication aptitude, for school and career purposes. Companies are searching for technical candidates with strong communication, collaboration, and problem-solving skills (Napier & Johnson, 2007). Teaching with collaborative technology assists with improving students' collaboration, communication, and collaborative technology competencies for school and career. In today's society, on-campus students oftentimes need to collaborate with off-campus peers and colleagues must collaborate with each other when they are not physically in the same location. This collaboration often includes peers who are in an online course and peers in a face-to-face course who desire to meet online to work on a project. In the workforce, employees and clients in various geographical locations, working remotely, are rapidly growing. Collaborative technology is expanding due to the increasing use of 21st century information-literate individuals producing knowledge by effectively utilizing technology.

To prepare pupils for careers, higher education institutions must integrate team projects in their courses (Napier & Johnson, 2007). Google Apps Education Edition benefits students and assists professors with meeting standards without requiring a suite of tools that cost money, in times of higher education budget shortfalls. According to Napier and Johnson (2007) students may have a limited amount of time for teamwork that is flexible, so professors must coordinate team meetings or establish technology tools that can be utilized. For this study, the following technical tools were used: (a) Gmail, (b) Google Sites, (c) Google Docs, (d) Google Spreadsheets, (e) Google Voice, (f) Google Forms, (g) Google Calendar, and (h) Google Tasks. Results indicated those professors' perceived teaching collaboration skills with Google Apps Education Edition as beneficial; however, not all professors were taught how to effectively coach students how to use the tools. Most professors taught themselves how to employ Google Apps and instruction for students regarding how to use Google Apps varied drastically. In this respect, two professors modeled the basics on how to use Google Apps by verbally instructing in combination with visuals. Four professors verbally talked about Google Apps without any visuals or organized direct teaching. Lastly, two professors assumed students already knew how to operate the tools or would independently problem-solve

Professors predominantly utilized Gmail, Docs, and Calendar to communicate, collaborate, collect information, and schedule. Professors also utilized other Google Apps such as Google Sites, Google Spreadsheets, Google Presentations, Google Forms, and Google Groups. A majority of the professors stated that they teach with Google Apps, because they are

accessible, free, include collaboration tools, include communication tools, and the tools are not cumbersome with groups.

It is recommended that professors are taught how to use various types of collaborative technology tools. A university could pay an outside expert or on-staff specialist to lead professional development classes. Team learning is vital to improve problem-solving, decision-making, and task performance (Andres & Shipps, 2010). Professors need to scaffold teaching tools by allotting time in class to teach students how to effectively use the tools, have a frequently asked questions or tutorial webpage to refer to, practice using the collaboration tools together as a class, and initially assign a small project utilizing the tools. Students need to pay attention to instruction, refer to online assistance if confused, participate in classroom practice, and complete small assignments. Professors can assign larger projects utilizing the tools, however, it would be helpful to hold online or face-to-face conversations regarding what students' are learning as they use these tools, so they are aware of the skills they are acquiring; in addition to course content. Professors also responded that they were interested in learning more about Google Apps, so they would be open to having instructions on how to implement and integrate the tools. When preparing an assignment or project, educators need to view the technical and social facets of team-learning (Andres & Shipps, 2010). The professors, students, and the research finding support that communicating and collaborating (online and offline) are helpful skills in school and necessary for success in the workforce. The most common reason for the high drop-out rate of college graduates from the workforce is their inability to communicate with their peers and superiors (Denny, 2006). Google Apps Education Edition is an excellent teaching strategy choice, since it is free for many universities and there are many applications to build on students' collaboration and communication skills.

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