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Journal Profile

The *Journal of Research in Business Information Systems* (JRBIS) is a national blind-reviewed, refereed publication published annually by the Association of Business Information Systems. This refereed journal includes articles from fields associated with business information systems focusing on theory, problems associated with information systems and information resources in education, business and industry, government, and the professions.

Manuscripts are selected using a blind review process. The first issue of the Journal was available Spring 2008. The Journal is listed in the ERIC Database and Cabell's Directory of Publishing Opportunities in Accounting, Computer Information Systems, Education, Instructional Technology, and Management.

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Journal of Research in Business Information Systems (JRBIS)

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You are invited to submit manuscripts for publication consideration in the next issue of the *Journal of Research in Business Information Systems (JRBIS)*, a national blind-reviewed, refereed journal published annually by the Association of Business Information Systems (ABIS). According to the Constitution and Bylaws of ABIS, the published articles of *JRBIS* are limited to the papers presented at the previous ABIS Annual Conference and/or published in the *ABIS Proceedings*.

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Submissions of manuscripts relating to topics, along with research findings, theoretical and practical applications, discussions of issues and methods for teaching and assessing instructional technology, and reviews of textbooks are encouraged. Manuscripts will be selected using a blind review process. Manuscripts should not have been published or be under current consideration for publication by another journal.

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All manuscripts must be submitted electronically in Microsoft Word format. Manuscripts, citations, and references must use the style format of the *2010 Publication Manual of the American Psychological Association* (6th edition).

Submissions should include a separate file attachment for the title page that contains the following information in this exact order:

- Title of the manuscript
- Each author's full name; position/title; institutional affiliation, including address, city, state, zip code; home, office, and cell phone numbers; and e-mail addresses (identify the main author who should receive all correspondence).
- Number of words in the article (including all parts—everything)
- Biographical paragraph (50-60 words) for each author
- Any acknowledgments or information about manuscript history (e.g., based on a conference presentation)

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The manuscript body must adhere to the following guidelines:

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- 1” margins all around
- Times New Roman, 12 pt. font-size text within article
- Bold and center primary headings, with major words capitalized
- Bold and left-align secondary headings, with major words capitalized
- No footnotes or endnotes
- No page numbers or headers or footers

Tables and figures may have varying font sizes (but must adhere to APA Style). Include tables or figures formatted and placed correctly within the manuscript.

Include the References page at the end of the manuscript, followed by any appendix information, if necessary.

All submissions will be reviewed by the editor and at least two reviewers, using a blind-review process. Authors will receive feedback 6-8 weeks after the initial peer review. Manuscripts will be “accepted,” “accepted with minor revisions,” “possibly accepted after major revision and resubmission for further peer review,” or “rejected.”

The editor reserves the right to edit selected/accepted manuscripts for publication as deemed appropriate and necessary for the optimization of journal publication and format. The author of the manuscript retains responsibility for the accuracy of a manuscript published in the *Journal of Research in Business Information Systems*.

To ensure your manuscript is considered for publication in the *Journal of Research in Business Information Systems*, submit the manuscript by August 31, 2020, to Dr. Ashley Hall at hallaa@sfasu.edu.

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FACULTY AND STUDENT COMMUNICATION

Dr. Eddie Horton, Northwestern State University

Abstract

Communication between students and faculty is essential, yet there are major differences in the way students and faculty approach communication. There is a disconnect in communication between students and instructors, especially in traditional brick and mortar schools. Studies have shown that a disconnect exists, and approached the faculty on this topic, but little research has focused on student views of this topic. The purpose of this qualitative single case study was to explore the reasons for the disconnection in communication between students and instructors at traditional universities. This study is built around the theoretical framework of the communication process and the uncertainty reduction theory. In this study, ten students and ten faculty were interviewed to explore the disconnection.

Keywords: communication, communication disconnect, faculty communication, student communication, social media, communication framework

Introduction

For a student to be successful in a class, whether online or in a traditional format, communication with the instructor is essential. Communication begins at the beginning of the course with the distribution of a syllabus and does not end until final grades are posted and accepted (Thompson, 2007). Students maintain communication with faculty in the classroom, as well as by utilizing office hours, email, and in some cases, social media.

Any time there is communication there is a chance for a communication breakdown. In the case of communication with faculty and students, communication can break down in a variety of ways. When communication fails, a breakdown in the transfer of information occurs, which can lead to missed assignments, hurt feelings, and misunderstandings (Kowalski, 2008).

The Problem

There is a disconnect in communication between students and instructors, especially in traditional brick and mortar schools. In early studies, D. Smith and Minnick (1996) showed that there is a disconnect in communication and in a more recent exploration, Carlson (2013) confirmed that this communication disconnect still exists. Educational leaders at traditional schools have been reluctant to embrace new technologies; this reluctance can lead to students leaving these schools in search of online or hybrid options (Mansour & Mupinga, 2007).

The general business problem was that, as students leave the traditional university for a nontraditional online education, the revenues they could generate are lost. Considering that most states have already cut higher education spending, this can lead to disastrous consequences for a university (Chakraborty, 2009). This loss of students and revenue ultimately leads to job cuts and possibly even school closures. On a broader scale, students pursuing nontraditional online education or moving elsewhere to complete their education can affect an entire region or state due to a loss in revenue and potential reduction in the qualified workforce.

Purpose of the Study

The purpose of this qualitative single case study was to explore the reasons for the disconnection in communication between students and instructors at traditional universities. The

study population included students and faculty at a traditional university. Each participant was to focus on a single communication event with a student or faculty member.

The subjects were students and faculty from a traditional university in Louisiana who were interviewed to identify reasons for a communication disconnection between students and instructors. The primary research instrument for this study was an interview. Secondary data included available syllabi to determine if communication preferences are mentioned. A syllabi review was limited to those made available by the instructors.

Communication Process and the Uncertainty Theory

Modern theories of communication begin with a discussion of the communication process. Communication itself is a process by which information exchange takes place between a sender to a receiver (James & Cinelli, 2003). In the modern communication process, the sender and receiver may not be individuals, but could be a computer or could be persons using some electronic means. James and Cinelli (2003) identified the communication process in five steps. First, the sender has some piece of information to transmit. Second, that information is encoded in some way so that it can be sent. Encoding can be verbal, whereby an idea is shared from a person, or nonverbal, perhaps encoded in an email. Third, some channel must exist to transmit the message. This can be a voice, if the sender is talking to someone, or by means of an email server for electronic communications. Fourth, the receiver must receive and decode the message. Finally, the receiver acknowledges receipt of the message (James & Cinelli, 2003). Figure 1 illustrates the communication process.

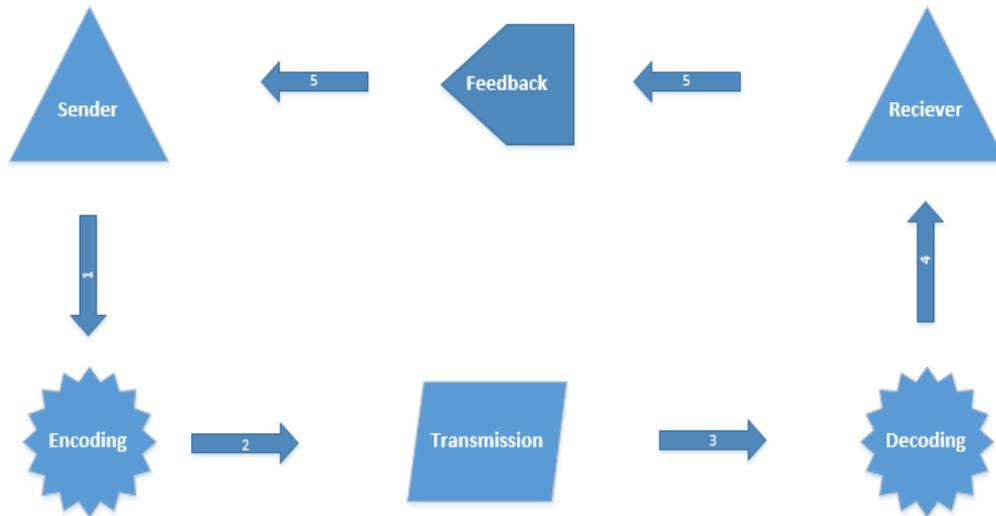


Figure 1. A graphical representation of the communication process. Adapted from James and Cinelli (2003).

Many barriers can exist that interrupt the communication process (James & Cinelli, 2003). In verbal communication, a breakdown can occur in encoding or decoding the message if the sender and receiver speak different languages. Electronically, the channel can breakdown if the technology fails. A breakdown can also occur based on assumptions, beliefs, gender, or age (Adamkova, 2014). In face-to-face communication, these breakdowns can be both verbal and nonverbal. With electronic communication, this can occur if the participants do not adhere to rules such as netiquette.

The uncertainty reduction theory describes three ways uncertainty affects communication (Kramer, 1999). This theory, first developed in 1975, states that uncertainty in communication exists and, in some situations, cannot be controlled or understood. The first part of the theory explains that, as communication increases, uncertainty in communication decreases (Kramer, 1999). In a classroom setting, uncertainty in communication is very high on the first day when

students meet the instructor. Uncertainty is high because they do not know the expectations or styles of that instructor. As the class continues, the students learn more about the instructor causing the students' level of uncertainty to decrease. In this case, an example of an uncontrollable aspect could be student motivation (Kittrell & Moore, 2013). Regardless of what the sender does, if the receiver is unwilling or unable to receive the message, effective communication cannot take place.

Uncertainty is unavoidable, but it can be mitigated to an extent (Kittrell & Moore, 2013). In a classroom, the student can mitigate uncertainty about the instructor by gathering information about that instructor before the course begins. This information can be gathered from peers or from internet sources such as Ratemyprofessor.com, a site that allows students to write reviews of their instructors for others to view. Extra information, however, can lead to miscommunication if the student misinterprets that information (Crago, Eriks-Brophy, Presco, & McAlpine, 1997). An example of this miscommunication might be that some students post negative reviews of an instructor simply because they failed the course.

The communication privacy management theory discusses information from the perspective of the sender wanting to keep some information public and some private (Frampton & Child, 2013). With electronic communication being such a driving force, this theory becomes important because a receiver can form a biased impression of a sender or information before the communication is even sent. An illustrative example of this is information found on a Facebook page. If a student views the personal page of an instructor and determines that the instructor is overly religious, the student may form a bias against this instructor even though no communication has taken place. Another issue with electronic communication exists in that it can be stored indefinitely, and security breaches can make potential private exchanges public.

Facebook, as an example, retains information for an indefinite period of time and reserves the right to sell some of that information to third parties (Facebook, 2015).

These theories can be used to define how communication takes place and discuss some ways communication can breakdown. With the communication theory and the uncertainty theory as a framework for this project, it becomes clear where communication fails between students and instructors and suggests some actions both students and instructors can take to mitigate the communication disconnection. By improving the student-faculty relationship, retention will remain higher as more students succeed in their academic endeavors.

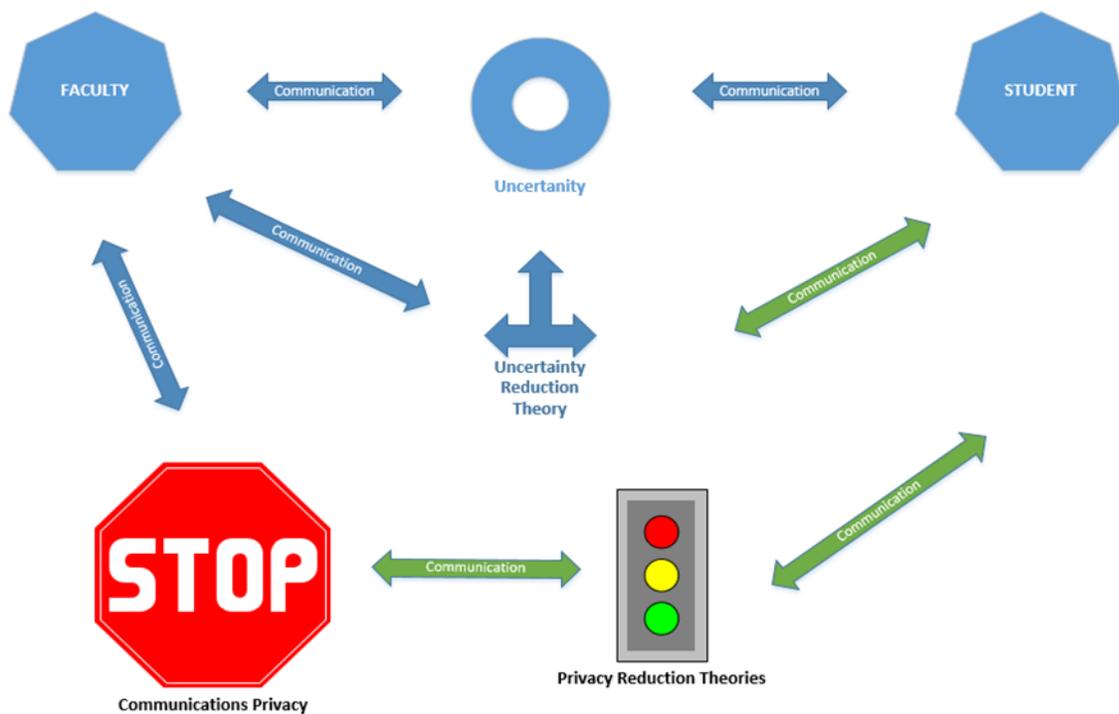


Figure 2. Faculty and student communication.

Figure 2 illustrates faculty and student communication and communication theories as a conceptual diagram. Uncertainty is a factor that can interfere with communication (shown as the

blue circle). By applying the principles of the uncertainty reduction theory, avenues of communication and communication effectiveness can be increased. Another factor that affects communication is identified by the communications privacy theory. Once privacy reduction theories are applied, more avenues of communication are open. Hindered communication is noted by the blue arrows, and unhindered communication is represented by the green arrows.

Research Questions

The following research questions and sub-questions were developed to qualitatively explore the communication disconnection:

RQ1. What are the reasons for the disconnection between students and instructors at a traditional university?

RQ2. What measures can be taken to reduce the communication disconnection between students and instructors at a traditional university?

Six sub-questions narrowed the focus but left open the primary questioning of the reasons for disconnection in communication (Schram, 2006).

SQ1. In communication with faculty and students, where does communication break down at a traditional university?

SQ2. How do privacy issues affect communication between students and instructors at a traditional university?

SQ3. How do factors such as age, gender, and ethnicity affect communication between students and instructors at a traditional university?

SQ4. What aspects (if any) of social media can be used to prevent the breakdown of communication between students and faculty?

SQ5. How does availability affect communication between students and faculty?

SQ6. How do communication barriers change when faculty provide additional availability outside of traditional office hours?

Significance of the Study

Students are leaving traditional universities in very large numbers, many without a degree and with a high level of student debt (Dwyer, 2015). In one study, Waldron (2012) indicated that as many as 46% of students entering a four-year program fail to graduate within six years. Some reasoning behind this can be described with the "just a number" effect, by which students feel they are just part of a larger system and go largely unnoticed. In 2011, researchers at Harvard listed the "just a number" effect as the fifth most common reason that students leave school (Dwyer, 2015). Much of this effect can be alleviated with proper communication between students and faculty.

By alleviating the disconnect in communication between students and faculty, the cycle of students feeling they are just a number can be eliminated. Faculty can use this information to ensure that students do not feel like a "number" in a class, and therefore feel more invested in their education. Keeping those students happy will help them realize their education and future goals, which will ultimately help the university, by increasing graduation numbers and completion scores, ensuring the university a better opportunity to survive and grow.

It is also important to note that this information can be beneficial to the student as well. If the students are provided information on the challenges faculty encounter when communicating

with them, they can explore other avenues to ensure proper communication takes place. When both parties understand how the other communicates, effective communication can be increased significantly.

A Brief Review of the Literature

Effective communication requires success from both the sender and receiver of the message, and many things can contribute to a breakdown in the process (Quilliam, 2008). In face-to-face communication, breakdowns can occur in body language, such as eye contact and vocal inflection (Quilliam, 2008). Not all communication takes place in a way that body language or vocal inflection can be measured—such is the case with email and social media. In fact, more than 90% of students use at least some form of electronic or social media (email, Facebook, or an LMS) for communication (Bart, 2011).

How one communicates can be altered by previous experiences (Lengruber, Carvalho, & Louzada, 2015). The researchers looked at how a set of nursing students communicated with patients who had mental health issues. The researchers found that those students who had been exposed to someone with a mental health issue earlier in life (i.e., a family member or schoolmate) were able to more easily communicate with some mental health patients. This could also be true for student-faculty communication when dealing with special needs students. Teachers with previous experience dealing with special needs students will probably be more prepared to communicate with such students in future communications.

Electronic Communication

Electronic communication is by no means the only form of communication. Lacono et al. (2006) recently suggested that, in some cases, electronic communication is not the best method.

Here, the researchers explored communication of those with complex communication needs, such as the impaired, and found that in some cases non-electronic aids (i.e., flashcards, pictures, or communication boards) aided more in communication. Lacono et al. hypothesized that this may be because these more traditional methods of communication are far less likely to fail than electronic communication. Of 163 individuals interviewed in the study, 73% requested the traditional communication aid as a backup/failsafe when electronic communication failed.

Sussman and Sproull (1999) explored a very interesting topic of electronic communication: the delivery of bad news. While their research is somewhat outdated, it offers some very interesting conclusions. Sometimes, communication is used to deliver bad or negative news. This is often not a pleasant task for the communicator who is delivering this news (Sussman & Sproull, 1999). In a study of 117 participants, the researchers determined that those who presented negative news using electronic means, even if those means were real-time (which in 1999 meant some kind of chat program, as text capable phones were not readily available), had a negative view of the communication and felt the same sensations as those presenting the same news face-to-face (Sussman & Sproull, 1999).

Communication Barriers

Keles (2013) discussed communication that may arise when different cultures are brought together. In this work, the researcher explored how communication affects a group of European exchange students who were placed in Turkey for an exchange program. There is quite often a higher level of anxiety when people from different cultures communicate because people tend to have a basic desire to be with people who are more like themselves (Keles, 2013).

Eksteen and Basson (2015) explored differences in the way people communicate. In their research, they explored ways of teaching communication strategies to pharmacy students, based on the personality type of a patient, as determined by the Myers-Brigs Type Indicator (MB TI). The MBTI locates people on four dimensions based on their preferences.

The four dimensions of the MBTI test are designed to identify a person's individual personality along four dimensions (Eksteen & Basson, 2015). The first dimension, introversion versus extroversion, represents the balance between the inner self and the outer world. The second dimension, sensing versus intuition, represents the balance between facts and detail versus patterns and possibilities. The third dimension, thinking and feeling, reflects a focus on logic and analysis versus personal values and priorities. The fourth and final dimension, judging versus perceiving, represents structure and control versus flexibility and spontaneity.

Faculty-Student Interaction

Several factors can contribute to students missing important emails, including the simple overload of messages they may receive. Depending on the learning management system (LMS) in use an instructor may set the system to send an email to the student if anything changes in the course (Roblyer et al., 2010). While this is great in theory, it could potentially lead to several messages being sent each day. With so many messages, it is common for the student to simply delete them, thus missing the one important message from the instructor. Another factor that can affect student email is spam. Scholars have estimated that 88% to 90% of all email on the Internet is spam; of that, approximately 19% slips through spam filters and into inboxes (Fogel & Yarmish, 2012). Because students are not checking email appropriately, they often miss important classroom issues. This leads to the student failing the course, or worse yet, dropping

out of the institution. This ultimately leads to lower enrollment and hurts the university through the loss of revenue.

Arkilic, Peker, and Uyar (2013) discussed the importance of information technology and collaborative learning. The researchers conducted a survey to determine preferences of communication based on demographics. Part of the research was designed to explore the idea that most e-learning systems lack a collaborative component (Arkilic et al., 2013). For the most part, a student is alone in an online class in that they do their work, turn it in, and move on.

Arkilic et al. (2013) looked at computer-supported collaborative learning (CSCL) and how it can be integrated into an online class for a better experience. The researchers discovered that among the collaborative tools explored, instant messaging and shared directories were the most useful tools, followed closely by a private discussion group and a collaborative document management system. These tools could also be useful for faculty and student communication. For example, an instructor could have the student post a paper on a collaborative system such as Google Docs. The instructor could then grade the paper, making notes for the student to make revisions. This could also be used in student-to-student communication when a group paper is required, and students could access the paper to work on their own parts.

Duta (2015) addressed communication barriers in communication between students and instructors. The researcher indicated that a prime issue in student-faculty communication is the fact that faculty generally believe that messages sent reach the sender with the same meaning as was intended. This is not always the case, as students often misinterpret messages from faculty (Duta, 2015). In a survey conducted by the researcher, lack of feedback was determined to be one of the major causes of communication barriers. If the faculty member is late, or provides

poor feedback early on in a course, the student is far more likely to not pay attention to communication later in that course.

Other barriers exist in communication between students and instructors including disinterest in the subject, physical barriers, perceptual barriers, language barriers, and gender barriers (Duta, 2015). Many of these do not have single-response solutions. For example, a physical barrier such as noise outside of a classroom because of construction elsewhere on campus, cannot always be solved. Many barriers do not have simple solutions.

Design

For student participants, the interview began with an exploration of a communication issue experienced with a faculty member in the past. Students were given a guarantee that the faculty member they spoke about would not be informed of the interview and that all personal data from both the student and faculty member would be stripped in the results. The student was asked to describe, in detail, the experience. The student was then asked what could have been done to mitigate or eliminate the communication issue. This led to a discussion of factors that may or may not have influenced the communication issue. Finally, a more general question as to what advice they would give a faculty member to make communication with students easier was asked. The eight questions are as follows:

1. You mentioned that you've had a communication issue with at least one faculty member in the past. Tell me about that experience.
2. What could you have done to eliminate or mitigate much of the communication issue you had with that faculty member?
3. In your opinion, where does communication with faculty and students tend to

break down the most?

4. Do privacy issues affect your ability to communicate with faculty? If so, how?
5. Were age, gender, or ethnicity factors in your communication breakdown with a faculty member? If so, please explain.
6. Could faculty use of social media aid in the prevention of communication issues between students and faculty? If so how?
7. Do communication barriers change if faculty provide additional methods of communication outside of traditional office hours? If so, please explain.
8. What one piece of advice would you give faculty that you feel would make communication with a student easier?

For faculty participants, the interview was much the same. The eight questions faculty asked were as follows:

1. You mentioned that you've had a communication issue with at least one student in the past. Please tell me about that experience.
2. What could you have done to eliminate or mitigate much of the communication issue with that particular student?
3. In your opinion, where does communication with faculty and students tend to break down the most?
4. As a faculty member, what are your personal expectations of privacy? Do you feel that helps, hinders, or has no effect on communication with students?
5. In what way could age, gender, or ethnicity have been a factor in your communication breakdown with this particular student?
6. How might faculty use of social media help mitigate communication issues with

students?

7. How could the addition of communication methods outside of traditional office hours will help break down communication barriers?

8. What one piece of advice would you give students that you feel would make communication with a faculty member easier?

Findings

Analyses of course syllabi received from faculty members along with faculty members' and students' transcribed interviews revealed the following five primary themes: (a) communication breakdowns, (b) privacy concerns when communicating outside of traditional academic platforms, (c) demographic variables, (d) social media platforms as mitigating tools for communication problems, and (e) advice. Although faculty members and students made comments related to each of the primary themes, different subthemes emerged for each group within the primary themes.

RQ1: What are the reasons for the disconnection between students and instructors at a traditional university? Findings from an analysis of the syllabi and interviews with faculty and students revealed that both groups identified similar but distinct explanations for the disconnect between faculty and students. While both groups identified that there were some significant problems with effective communication, faculty members had a higher rate of agreement regarding the reasons for communication problems than students did. Accordingly, most of the faculty members attributed the problems with communication to students not listening to instructions as well as not reading emails in their entirety; however, some of the faculty members acknowledged that they might not be disseminating information as effectively as they should be. This assertion was further confirmed through an analysis of the syllabi received from the faculty

members, which revealed that only one faculty member had specifically identified the most efficient means of communication. In a similar nature, some students attributed the problems with communication to students being hesitant to approach faculty members with problems. Although faculty members believed that they were effectively communicating their willingness to speak with students, many students did not feel that this was the case.

Despite the congruence of faculty members' assertions regarding their willingness to communicate with students, the analysis of syllabi that students received showed only one faculty member specifically mentioning to the students that they should not hesitate to ask any questions at any time. The syllabi revealed that the University does not have a set email policy for syllabi to go along with other standard requirements such as the classroom civility statement or Title IX information. Some colleges have policy set by the dean, but this University does not have a standard for classes. Further analysis of the syllabi also revealed that only three faculty members specifically mentioned the turnaround time on emails that students should expect. One faculty member from the Department of Criminal Justice had this policy:

Official Communication: I convey information concerning this course in class, by email, by phone, and by posting same on the Course Updates and Information link of the Moodle Homepage. Students are individually responsible for timely acquiring such information by attending class, regularly accessing their NSU emails and the Course Updates and Information link, and providing accurate preferred phone numbers and emails. Failure to do so is no excuse for not acquiring the information.

A faculty member from the College of Business and Technology had this policy:

This course uses Moodle as a course management system. You should check Moodle at a minimum of every 48 hours to see if there are changes. I will use NSULA email for communication. You should check your email at least every 48 hours. I strongly suggest you set email up on a phone so you can check it more often. I also STRONGLY suggest you sign up for my remind service (next post).

In both examples, there is an expectation that students should reply quickly, but there is no expectation of how quickly the faculty member would reply.

Ultimately, insight into what participants believed were the primary contributing factors to the disconnection between faculty and students can be found by analyzing the advice each group gave to the other. Specifically, the advice responses indicated that each group's perspectives were generally one-sided, with faculty members believing that they were doing their best to communicate with the students, while students were more inclined to feel that faculty members were not approachable or willing to accept changing communication platforms.

Communication breakdowns. There were two communication breakdown subthemes that emerged from interviews with faculty members: not reading or listening and basic communication. Sixty percent of the interviewed faculty members identified that communication breakdowns with students were primarily related to students not thoroughly reading the emails sent to them or not listening to information delivered in the classroom. For instance, one faculty member made the following comment: "They do not read all of the directions, and then, in my particular case, they didn't even hold out what they wrote against what my example was." Since communication breakdowns can occur on both sides of the aisle, the remaining 40% of faculty members attributed the breakdown in communication to basic communication issues that were either related to the students or problems identified on their side. Accordingly, one faculty

member mentioned, “Once you’ve done something a few times you make assumptions, and so you forget to communicate, or you overlook communication.”

Interviews with the students revealed disparate explanations for communication breakdowns with professors; however, one subtheme emerged related to emails. More specifically, 20% of students made comments related to professors having a slow response time to emails, while another 20% referenced difficulties with interpreting emails. Two students specifically mentioned that sending and receiving was where the breakdown occurred, with one commenting that waiting a couple of days for a response to a question was frustrating. Another student commented, “It really breaks down over email because it’s not very easy to discern what you want from an email compared to like a phone or even face-to-face”. Bearing similar sentiments, a student remarked that breakdowns arose when communicating “anything via technology.”

The remaining six students had differing perspectives on what caused breakdowns in communication. One student attributed the breakdown in communication to a failure of the faculty to understand that students may have other responsibilities demanding their time on top of classwork. In contrast, the three other students believed that a primary cause for the breakdown in communication was related to hesitancy on the students’ part to approach professors and communicate effectively. As one student explained, “They don't communicate clearly to the faculty, and I think a lot of the professors are not -- they are not mind readers and they don't ask the right questions to the faculty member.” Another student attributed communication breakdowns to issues related to the availability of the professors, while one student believed that breakdowns in communication occurred outside of the classroom when personal issues enter into the conversations.

Advice. The final question from the interview guide was designed to gain further insight into what advice participants would give to help remedy communication problems between faculty and staff. As such, the overriding theme that emerged from the faculty members' comments (70%) was for students to be assertive and communicate with their professors when they have problems or questions. As explained by a faculty member, "If you're having a problem, contact the professor immediately. Do not wait until the 11th hour."

In contrast to the faculty members' general agreement on advice to students, the students' advice to faculty members was a bit more scattered. Three themes emerged from students' recommendations to faculty members: more open/approachable, embrace technology, and offer encouragement. Table 1 outlines excerpts from students' statements regarding the ways in which faculty members could mitigate the disconnect with students.

Privacy concerns when communicating outside of traditional academic platforms. When speaking about encountering students in private situations outside of the university, all faculty members indicated a willingness to engage in conversations; however, the content of what they were willing to discuss varied. More specifically, three participants indicated that while they would be willing to discuss general topics, they would not feel comfortable discussing the student's personal academic situation. One faculty member commented, "For me, it's largely content-driven." Conversely, five faculty members stated that they had no problems with discussing students' private academic information in a public setting outside of the university. For example, a faculty member stated, "Anytime they're ready, I'm ready."

Overall, most students (70%) indicated that they had no privacy concerns when encountering faculty in a public situation off-campus; however, almost one-third of the students (30%) distinguished between social and official discussions. More precisely, seven students

revealed that they had no problems with discussing official or private matters with their professors in public, while three students felt that official matters should only be discussed through official means. As one student remarked, “I do feel comfortable, as a matter of fact, this semester I saw my adviser and I walked up to her when she was available and introduced myself.” Another student stated, “Social conversation, but I won’t bring up work topics with them.”

Demographic variables. Findings from faculty and student responses to the inquiry related to whether gender, ethnicity, or age contributed to communication breakdowns revealed some rather interesting similarities and differences between the two groups. One of the similarities noted during the analysis of the transcripts was that four individuals from each group felt that age played a significant role in communication breakdown. Another commonality found between the groups involved each group having one individual who indicated that communication problems were not necessarily related to ethnicity, but rather to language barriers associated with nationality. As such, nationality, as a demographic variable, was added. While the faculty only had two individuals who did not attribute communication problems to demographic variables, 50% of student participants indicated that they could not identify any communication problems associated with demographic variables.

RQ2: What measures can be taken to reduce the communication disconnection between students and instructors at a traditional university? After a thorough review of both faculty members’ and students’ responses, both groups identified social media as having the potential to mitigate problems with communication; however, neither group gave much insight into the appropriate means through which to accomplish this. A minority of participants in both groups thought Facebook would be an appropriate forum for communicating, with most in both groups

preferring to keep their social lives separate from their professional or academic lives. Since faculty members were generally more inclined to prefer traditional methods of communication and students expressed a desire for immediacy with response times, the comments that suggested setting up official social media groups as a method of mitigating communication problems might be worth further exploration.

Social media platforms as mitigating tools for communication problems. Both faculty and students indicated that there were several ways in which Internet platforms could aid with mitigating communication issues, especially outside of traditional office hours; however, most respondents in both groups indicated that professional communications should be reserved for platforms other than Facebook. For instance, while some faculty members (30%) indicated that social media platforms could potentially mitigate some communication issues, most (70%) were more comfortable using traditional academic methods of communicating. This finding was echoed by the interviews with students, specifically in relation to keeping the personal separate from the academic. Only 30% commented that Facebook would be an acceptable way to alleviate communication problems, while 70% believed that other forms of social media platforms would be more appropriate. Table 2 offers some examples of faculty and student responses regarding using internet platforms as mitigating tools for communication problems.

Evaluation of Findings

To answer the first research question regarding what causes the disconnect in communication between faculty members and students, findings indicated that while faculty members and students identified similar problems with communication, they attributed the disconnect to somewhat different reasons. As far as 60% of faculty members were concerned, students were not engaged enough when listening to instructions and information when it was

delivered in the classroom, nor did they read instructions and information thoroughly when it was delivered via technological means. Regarding the in-class communication breakdown that faculty members attributed to students not listening, the methods that the professor is using to communicate the information may be part of the problem, specifically nonverbal communication (Quilliam, 2008). The breakdown in face-to-face communication may occur through an individual's body language, eye contact, and vocal inflections, thereby indicating that students may not necessarily be solely to blame. Furthermore, Duta (2015) found that students were less likely to pay attention to a professor's message in the classroom if that professor had a history of being late and giving poor feedback

Although it may appear as though students do not check their emails or read them thoroughly, researchers have indicated that this may not necessarily be related to them ignoring emails or not reading them in their entirety (Roblyer et al., 2010). Rather, students may simply be overwhelmed with emails, which can lead to them inadvertently deleting an important email from their professor (Roblyer et al., 2010). Fogel and Yarmish (2012) explained that since approximately 88% to 90% of emails are spam, it might be easy to unintentionally miss important emails. Moreover, when it comes to 40% of students who attributed communication breakdowns to misunderstanding the messages in emails, Duta (2015) confirmed that students do misinterpret information delivered via emails.

While findings from this study revealed that 40% of both faculty members and students attributed communication breakdowns to age differences, the literature review only offered one study related to age, which indicated that a breakdown in communication may occur due to age (Adamkova, 2014). Nevertheless, the literature review did offer some insight into this study's finding regarding the one student and faculty member who cited nationality as a contributing

factor to the communication breakdown they encountered. According to Keles (2013), when individuals from different nationalities have opposing primary languages, a communication breakdown is more likely to occur. Keles explained that not only can fundamental communication issues arise when people who do not share a primary language attempt to communicate with one another, but that the meanings behind certain idioms might be misinterpreted, which only exacerbates communication breakdowns. To ensure that all students understand what is being communicated, Nimoh (2010) recommended that professors should speak clearly and slowly, as well as have their students who are from a different region with a different language repeat the information that was delivered.

Another interesting finding regarding the contributing factors to the communication disconnects between students and faculty members were gleaned from the advice that each group gave to the other. More specifically, while faculty members believed that they were doing their best to convey their willingness to be approached regarding academic issues that students might be encountering, students were less inclined to feel that professors were approachable. Although the literature reviewed did not specifically address issues related to professors' perspectives versus students' perspectives, it did offer some insight into why students might be apprehensive about approaching their professors. This finding was confirmed by Florescu and Pop-Pacurar (2016), who asserted that students' fear of making mistakes was one of the primary contributing factors to poor communication between professors and students. Blume et al. (2013) also found that students who had higher levels of communication adaptability were more comfortable with interacting with their professors during class and outside of class. Mizrachi and Bates (2013) similarly asserted that many freshman students have difficulty with communicating effectively

because college is their first time on their own, which ties into the communication adaptability aspect that Blume et al. highlighted.

Findings from the theme of social media platforms as mitigating tools for communication were most relevant to the second research question. Findings revealed that while most students and faculty members agreed that professional and social platforms for communication should be kept as separate and distinct entities, they did acknowledge the potential for social media platforms to help mitigate communication problems. Neither the students nor the professors, however, could offer a succinct method with which to accomplish this. Wilson (2013) echoed these findings by identifying that although students and faculty members might have Facebook accounts, they fail to use them in a collaborative or educational context. Wilson also identified that while students and faculty members usually have Dropbox accounts, neither used them in a collaborative manner. In contrast to Wilson's assertion Sheldon (2016) found that professors who spent more time on Facebook were more likely to be Facebook friends with students who displayed similar social media behaviors, which improved communication. Sheldon (2016) also found that professors were more willing to become Facebook friends with students after they had graduated. This finding was echoed by one professor in the current study, who commented, "If you graduate and you think we have some things in common and we should perhaps be in contact via Facebook, send me a friend request."

Findings from the current study further identified that 70% of professors preferred more traditional means of communication, such as email, Moodle, and other university-developed platforms. Meanwhile, 70% of students were more willing to incorporate social media into their communication regimen, as long as it was separate from their personal lives. This finding is in line with the communication privacy management theory, which identified the importance of

keeping the private life separate from professional life (Framptom & Child, 2013). As such, despite the available technological resources to improve communication between faculty and students, neither group has managed to identify the best way to utilize these means of communication to enhance their ability to communicate with one another. Triangulation of the interview responses from the professors and the syllabi they distributed to students further revealed that only three faculty members communicated to their students the expected response time for emails, which may contribute to students' frustrations regarding turnaround times on emails.

Implications

Overall, findings from this study identified differing explanations from professors and students regarding the reasons for the communication disconnect between students and instructors at traditional universities. The reasons mentioned by students specifically included emails and the perceived approachability of the professor. While professors also mentioned emails, their responses were in stark contrast to the students' comments. Findings from this study also addressed the specific business problem related to instructors being unaware of the reasons for the communication disconnect by offering insight into students' perspectives. It should be noted that the literature reviewed for this study not only influenced the formulation of the research questions but also how the findings were interpreted. Indeed, while findings from this study were generally supported by the literature, the one deviation from the literature was the specific qualitative focus on the communication disconnect between students and faculty members in a traditional brick and mortar university classroom, as most of the literature reviewed relied on findings from surveys.

Recommendations for Future Research

Findings from this study indicated that more research is warranted in a number of areas. Specifically, more qualitative research is needed in relation to faculty members' and students' perceptions of the contributing factors associated with communication breakdowns.

Another area of research highlighted by this study involves the ways in which students and professors use available technology. For example, findings from this study and others have indicated that while both professors and students see value in social media, they are more inclined to draw a distinct line between the professional domain and the private domain (Frampton & Child, 2013). It could be beneficial for more research to be conducted to determine the best way to utilize social media and whether the incorporation of these methods of communication would hinder or improve communication between students and faculty members. Further research could also be expanded to see if these problems differ in a predominately or fully online university.

In addition, due to the single case study nature of this investigation, one of the primary limitations was an inability to generalize the results to a broader population. As such, further research should utilize a multiple-case study design that implements a qualitative approach at more than one brick-and-mortar university to investigate the communication disconnect between students and instructors. Furthermore, to address the limitation of this study related to the general questions posed by the researcher, findings from this study could be utilized to develop research questions during the design phase of future studies that are aimed at understanding the communication disconnect between professors and students at traditional universities.

Conclusion

This study has offered insight into the role that social media might play in mitigating communication problems between professors and students, with members in both groups identifying that while social media had the potential of alleviating some of the communication problems, it should not be the primary method of communication. Accordingly, faculty members and students were more inclined to draw a distinct line between the private sphere and the public sphere, as evidenced by 70% of both students and faculty members specifically mentioning that social communications should be separate from professional ones. Nevertheless, students were more willing to entertain the idea of incorporating some form of social media into their academic lives than faculty members were.

In conclusion, findings from this study revealed that both students and faculty members at traditional universities were extremely cognizant of the communication disconnect between them; however, neither group was able to articulate a solution to the problem. It was determined by both groups that, while technological advancements have made communicating outside of office hours easier, that didn't necessarily translate to better communication.

Ultimately, more research exploring the ways in which social media can be acceptably used to mitigate communication between students and faculty is warranted.

References

- Adamkova, T. (2014). Communication as an intergenerational barrier. *SHS Web of Conferences*, 10(1), 2-6. doi:10.1051/shsconf/20141000002
- Arkilic, I. G., Peker, S., & Uyar, M. E. (2013). Students' preferences of communication tools for group projects in a computer-supported collaborative learning environment: A survey. *Procedia - Social and Behavioral Sciences*, 83(2nd World Conference on Educational Technology Research), 1121-1125. doi:10.1016/j.sbspro.2013.06.214

- Bart, M. (2011, Apr. 22). *Survey says 80 percent of faculty use social media in their teaching*. Retrieved from <http://www.facultyfocus.com/articles/edtech-news-and-trends/survey-says-80-percent-of-faculty-use-social-media-in-their-teaching/>
- Blume, B. D., Baldwin, T. T., & Ryan, K. C. (2013). Communication apprehension: A barrier to students' leadership, adaptability, and multicultural appreciation. *Academy of Management Learning & Education*, *12*, 158-172. doi:10.5465/amle.2011.0127
- Brantlinger, E., Jimenez, R., Klingner, J., Pugach, M., & Richardson, V. (2005). Qualitative studies in special education. *Exceptional Children*, *71*, 195-207. Retrieved from <http://ecx.sagepub.com/>
- Carlson, S. C. (2013). Instructional methods influence critical thinking: Do students and instructors agree? *Academy of Educational Leadership Journal*, *17*, 27-32. Retrieved from <http://www.alliedacademies.org/public/journals/journaldetails.aspx?jid=5>
- Chakraborty, K. (2009). Impact of university budget cuts on the local economy: Case for a regional university. *American Journal of Economics and Business Administration*, *1*, 177-181. Retrieved from <http://thescipub.com/journals/ajeba>
- Crago, M. B., Eriks-Brophy, A., Pesco, D., & McAlpine, L. (1997). Culturally based miscommunication in classroom interaction. *Language, Speech & Hearing Services in Schools*, *28*, 245-254. Retrieved from <http://lshss.pubs.asha.org/>
- Dwyer, R. E. (2015). *Student loans and graduation from American universities*. Retrieved from <http://www.thirdway.org/report/student-loans-and-graduation-from-american-universities>
- Eksteen, M. J., & Basson, M. J. (2015). Discovering the value of personality types in communication training for pharmacy students. *African Journal of Health Professions Education*, *7*, 43-46. doi:10.7196/AJHPE.370
- Facebook. (2015). *Terms of service*. Retrieved from <https://www.facebook.com/terms>
- Florescu, M., & Pop-Pacurar, I. (2016). Is the fear of “being wrong” a barrier for effective communication between students and professors? A survey study at Babes-Bolyai University Romania. *Acta Didactica Napocensia*, *9*(2), 47-65. Retrieved from <http://files.eric.ed.gov/fulltext/EJ1110311.pdf>
- Fogel, J. J., & Yarmish, G. Y. (2012). Consumers and computer software advertisements in spam e-mail. *Journal of Internet Banking & Commerce*, *17*(2), 1-12. Retrieved from <http://www.arraydev.com/commerce/jibc/>
- Frampton, B., & Child, J. (2013). Friend or not to friend: Coworker Facebook friend requests as an application of communication privacy management theory. *Computers in Human Behavior*, *2257-2264*. doi:1016/j.chb.2013.05.006

- James, T., & Cinelli, B. (2003). Exploring gender-based communication styles. *The Journal of School Health*, 73(1), 41-42. Retrieved from <https://netforum.avectra.com/eweb/DynamicPage.aspx?Site=asha1&WebCode=JournalofSchoolHealth>
- Keles, Y. (2013). What intercultural communication barriers do exchange students of Erasmus program have during their stay in Turkey, Mugla? *Procedia - Social and Behavioral Sciences*, 70, 1513-1524. doi:10.1016/j.sbspro.2013.01.219
- Kittrell, D. L., & Moore, G. E. (2013). Student motivation. *NACTA Journal*, 57, 94-95. Retrieved from <http://www.nactateachers.org/journal.html>
- Kowalski, K. (2008). Tough questions: Recognize and resolve communication breakdown. *The Journal of Continuing Education in Nursing*, 39(2), 57. Retrieved from <http://www.healio.com/nursing/journals/jcen>
- Kramer, M. (1999). Motivation to reduce uncertainty: A reconceptualization of uncertainty reduction theory. *Management Communication Quarterly*, 13, 305-316. doi:10.1177/0893318999132007
- Lengruher de Azevedo, A., Carvalho de Araújo, S. T., & Louzada Vidal, V. L. (2015). How nursing students perceive communication with patients in mental health. *Acta Paulista De Enfermagem*, 28, 125-131 7p. doi:10.1590/1982-0194201500022
- Mansour, B. E., & Mupinga, D. M. (2007). Students' positive and negative experiences in hybrid and online classes. *College Student Journal*, 41, 242-248. Retrieved from <http://www.projectinnovation.com/college-student-journal.html>
- Quilliam, S. (2008). *Body language: Actions speak louder than words: Crack the unspoken code of body language* (New ed.). London, UK: Carlton.
- Roblyer, M. D., McDaniel, M., Webb, M., Herman, J., & Witty, J. V. (2010). Findings on Facebook in higher education: A comparison of college faculty and student uses and perceptions of social networking sites. *The Internet and Higher Education*, 13(3), 134-140. doi:10.1016/j.iheduc.2010.03.002
- Sheldon, P. (2016). Facebook friend request: Applying the theory of reasoned action to student-teacher relationships on Facebook. *Journal of Broadcasting & Electronic Media*, 60(2), 269-285. doi:10.1080/08838151.2016.1164167
- Smith, D., & Minnick, B. (1996). Electronic teacher-student communication. *Business and Professional Communications Quarterly*, 59, 74-81. doi:10.1177/108056999605900107
- Sussman, S. W., & Sproull, L. (1999). Straight talk: Delivering bad news through electronic communication. *Information Systems Research*, 10, 150-166. Retrieved from <http://pubsonline.informs.org/journal/isre>

- Tetnowski, J. (2015). Qualitative case study research design. *Perspectives on Fluency & Fluency Disorders*, 25(1), 39-45. doi:10.1044/ffd25.1.39
- Thompson, B. (2007). The syllabus as a communication document: Constructing and presenting the syllabus. *Communication Education*, 56, 54-71. doi:10.1080/03634520601011575
- Veletsianos, G., Kimmons, R., & French, K. D. (2013). Instructor experiences with a social networking site in a higher education setting: Expectations, frustrations, appropriation, and compartmentalization. *Educational Technology, Research and Development*, 61, 255-278. doi:10.1007/s11423-012-9284-z
- Waldron, T. (2012). *Study: Nearly half of America's college students drop out before receiving a degree*. Retrieved from <http://thinkprogress.org/education/2012/03/28/453632/half-college-students-drop-out/>
- Wilson, C. D. (2013). Making connections: Higher education meets social media. *Change: The Magazine of Higher Learning*, 45(4), 51-57. doi:10.1080/00091383.2013.806201

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SOCIAL MEDIA AND ITS IMPACT ON PROSPECTIVE EMPLOYEES

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Abstract

This study looks at the Millennial generation to determine if they prefer and/or are more comfortable using social media rather than traditional forms of communication when completing daily office tasks.

Keywords: social media, workplace, electronic communication, Millennials

Introduction

The Twenty-First Century has seen the inception of social media, smart phones, the spread of texting, countless instant messenger applications, and video calls. Along with these new instant communications technologies, the Millennial generation is now entering the workplace in full. These “digital natives” (Khoir & Davison, 2014) bring experience with and expectation to use more than just email to communicate with their coworkers and boss.

Millennials are not the only ones using social technologies in the workplace. Older, more established professionals were some of the early adopters of many social technologies. Khoir and Davison (2014) explained that defining a digital native is not as simple as labeling all Millennials digital natives, and all preceding generations, as not. Digital natives are any individuals fluent with social media, incorporating it into their online and offline lives (Khoir & Davison, 2014). Using this definition, a digital native can be anyone of any age or background who has adopted social media and incorporated it as part of their identity. While someone of the Baby Boomer generation or Generation X may be considered a digital native, the largest population of this working class are Millennials. While this paper looks at all digital natives and non-natives, age is an important demographic of this study.

For purposes of this study, social platforms are any electronic form of communication outside of email that provides an immediate and typically informal response. Social platforms of interest are Facebook, Twitter, Skype for Business, LinkedIn, and texting.

Literature

With well over 2½ billion users, Facebook has cemented itself as the largest social media platform in use globally (Facebook users worldwide, 2020). User numbers as large as Facebook show that Millennials are not the only demographic using social media platforms to supplement their communication. Because the adoption rate is so high, social media can be a powerful tool for businesses to reach new customer bases and provide another avenue for communication between co-workers.

With new technologies come benefits as well as risks. One of the greatest concerns is the lack of control of information. “Corporate bureaucracies resist losing control of information flows” (Burrus, 2010, p. 50). Employers are afraid their employees might use social media to share private corporate documents or poorly represent the company with an insensitive post. But, companies must change with the times and technologies to succeed.

“Business 2.0” as Burrus (2010) called it, is the adaptation of Web 2.0 applications and social media intended for personal use, to enhance business communication and information sharing. Major corporations and small businesses are integrating social media and other forms of social technologies into their businesses.

From an employer standpoint, the rise of social technologies and their prevalence in the workplace creates more opportunities for employees to be unproductive. Cyberloafing, or cyberslacking, is defined by Lim and Chen (2009) as “voluntary acts of employees using their companies’ Internet access for non-work-related purposes during working hours” (p. 343). In

2009, American employees spent an average of 10 hours a week browsing the Internet for non-work related reasons (Lim & Chen), and that was over a decade ago. Debate is ongoing whether cyberloafing in the workplace is truly detrimental, or if some amount of online browsing can lead to stress relief in what may be a hectic workplace. Beneficial or not, many companies are reluctant to allow their employees to use social media at work.

In 2013, Zhang and Venkatesh conducted a study comparing employees' online and offline social connections with their job performance. The researchers surveyed 104 employees of a Fortune 500 telecommunications company and 52 students in an undergraduate biology class from an undisclosed university (Zhang & Venkatesh, 2013). By and large, the research showed significantly higher performance from those with several online and offline social connections, both within and outside of the company as compared to individuals who had few social connections.

The benefit of these online connections is that "social networks act as conduits for resource exchange such that the more network ties employees have, the more likely they can leverage [information and communications technologies] to enhance job performance" (Zhang & Venkatesh, 2013, p. 22). Therefore, social technologies can be a useful tool to increase an employee's productivity when used to leverage established social connections for problem resolution and idea sharing.

Methods and Procedures

The following were hypothesized:

H1: Younger employees, particularly those of the Millennial generation, prefer to use social technologies to supplement traditional forms of communication (phone, face-to-face, and email) to accomplish day-to-day tasks in the office.

H2: Digital natives are more comfortable using social technologies to communicate with their coworkers than with their boss or supervisor.

H3: Millennials and digital natives want social media use to be acceptable in the workplace.

Using an online survey, working individuals' opinions about various forms of electronic communication were assessed. The survey asked ten questions, including two questions about age and occupation. The other survey questions ranged from what forms of communication the respondents use daily in their occupation, to what scenarios messaging or texting the respondent's boss would be appropriate. Gender was not considered to be a significant variable for this research; therefore, it was not requested.

To counter the limited time frame to maximize the variety of age and occupation, the survey was distributed through the author's Facebook and LinkedIn accounts. The survey was available online for two weeks.

Data Findings and Analysis

Twenty-nine responses were received, equating to a t-value of 1.701 at an alpha of .05. Of the 29 respondents, 62% were between the ages of 25 and 34, or firmly Millennials; and an additional 17% were between the ages of 18 and 24. Therefore, nearly 80% of respondents were younger than 35, and 21% were older than 34. No consistency in occupation was found as respondents represented a wide variety of career backgrounds.

The first question of the survey asked what forms of communication the participant used on a regular basis in his/her company, as shown in Figure 1. All but three respondents answered that email is part of their regular correspondence, but only two participants answered to using Facebook or another social media platform for the job. Unsurprisingly, traditional and

established forms of communication (email, phone, and face-to-face), had the highest rate of response with 26, 23, and 22 responses respectively. Texting, considered a social technology, was noted as being used in the workplace on a regular basis by nearly 69% of respondents. Skype for Business, a social technology offering instant messaging and video chat, was used by 41% of respondents, and 7 of the 8 responses categorized as “Other” included applications with similar features of Skype for Business, such as Google Hangouts and Slack. Therefore, with the corresponding “Other” responses factored in, 65% used a business-oriented social technology.

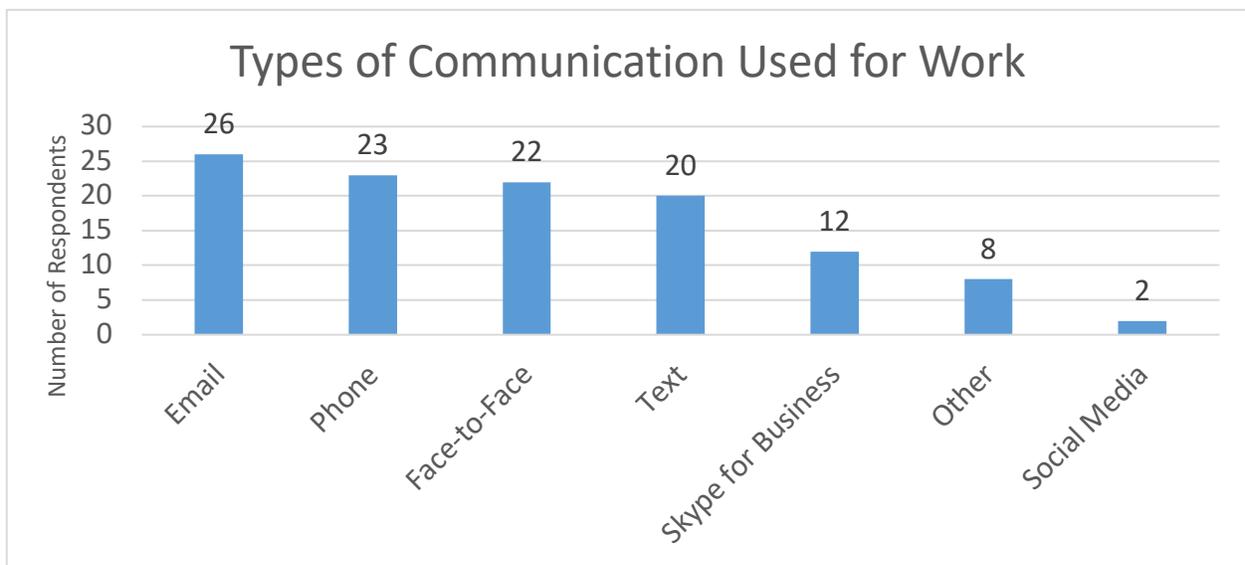


Figure 1. Respondents’ selection of technology used at work. The survey question allowed for the selection of multiple answers.

Two questions asked when it is appropriate to text or message coworkers on social media and when it is appropriate to text or message one’s boss on social media. All the responses indicated a clear bias away from communicating with supervisors through these means, except in the event of an emergency, as shown in Figure 2. These results support the hypothesis.

Responses for these two questions was lower, with only 24 responses, as these questions replaced two others after reported issues from early respondents.

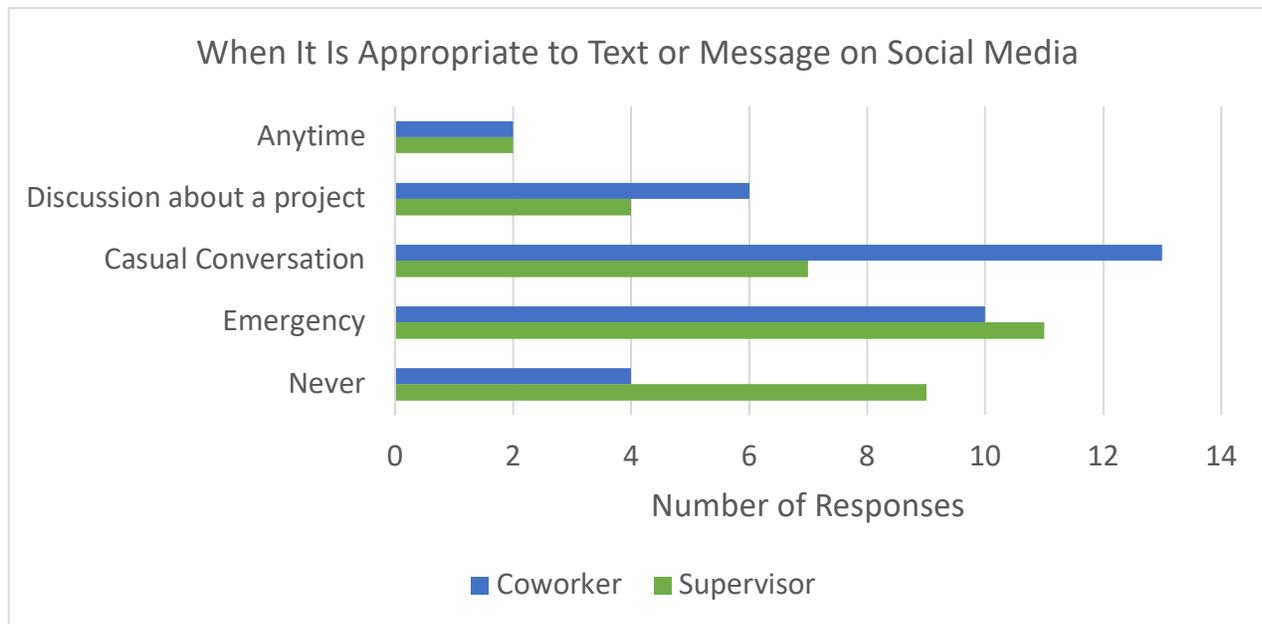


Figure 2. Comparison of respondents' comfort with using text or social media to communicate with coworkers vs boss in a given situation.

A few statements asked the respondent to select agree, partially agree, or do not agree, as shown in Figure 3. One of these statements was “Social media has no place in the workplace.” Of the 29 participants, 20 (69%) responded in the affirmative, selecting either “Agree” or “Partially Agree.” These results are in spite of nearly 80% of survey respondents being of the Millennial or younger generation, but do reflect the lower response of work-related social media users.

The survey results show solid adoption rates of texting and business-oriented social technologies including Skype for Business, but low use of social media platforms in the workplace. When used, survey respondents are more comfortable using social media or texting to casually converse with coworkers than with a supervisor. The largest group of responses for

when it is acceptable to communicate with a supervisor by text or social media was for *emergencies* only; a close second was *never*.

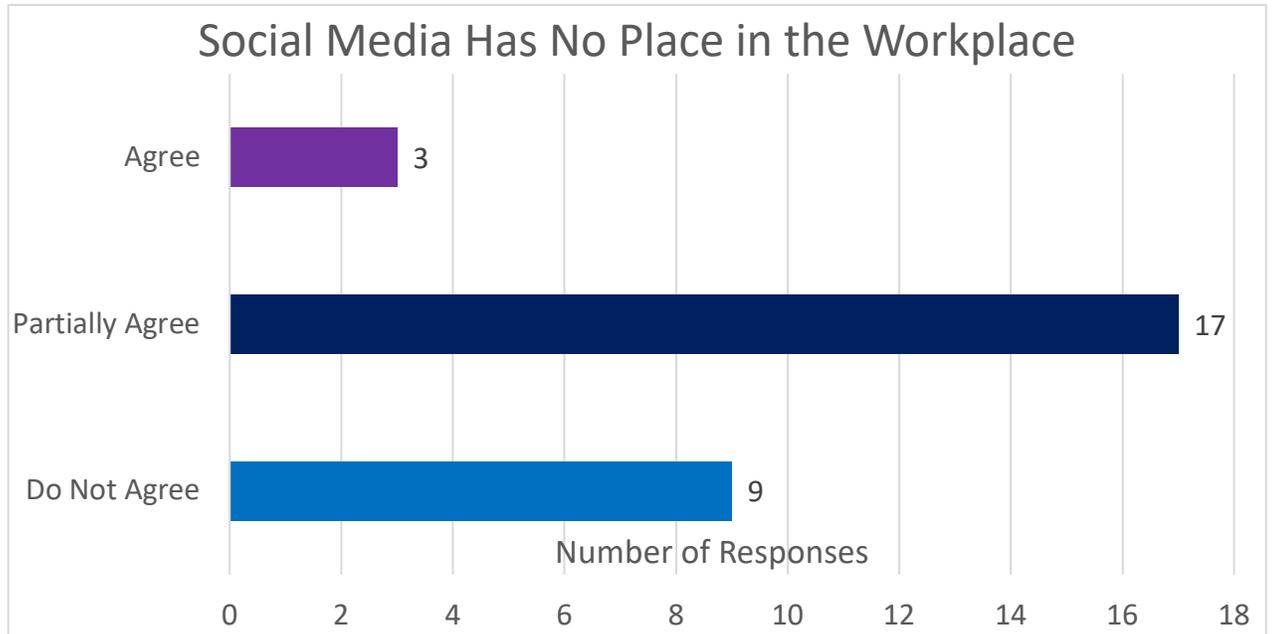


Figure 3. Response to the statement "Social media has no place in the workplace."

The hypothesis proposed three ideas. The first being that younger employees, particularly those of the Millennial generation, prefer to use social technologies to supplement traditional forms of communication (phone, face-to-face, and email) to accomplish day-to-day tasks in the office. With 65% of respondents using Skype for Business or other text and video chat programs, and 69% texting through their phones; the results of this survey effectively support the hypothesis.

Further, the second part of the hypothesis that younger employees are more comfortable using social technologies to communicate with their coworkers than with their boss or supervisor also support the hypothesis. Figure 2 shows a moderate trend to acceptance of social technologies for communicating with coworkers, but not with supervisors.

The third hypothesis, Millennials and digital natives want to see social media as an accepted part of the workplace, was not supported. While use of non-social media applications at work was high, social media platforms such as Facebook and Twitter were largely frowned upon, with only 31% of participants believing social media is a worthwhile addition to the workplace.

Perhaps, the most surprising finding from this research was the reluctance to use social technologies in the workplace despite the large portion of respondents below the age of 35. A recent study that surveyed 323 manufacturing employees in Baja, California, found a strong relation between heavy users of social media at work and job satisfaction and motivation (Rodríguez-Aceves, Madero, & Valerio-Ureña, 2018). “Light” users of social media at work, described as fewer than two hours a day, also showed a strong relationship with job satisfaction and motivation. The demographic in Rodríguez-Aceves et al. (2018) shared similar age characteristics. Therefore, given a larger sample size, the results between social media adoption in the workplace and younger employees might be higher and reflect Rodríguez-Aceves et al.’s research results.

An area not explored in this survey, but might explain the lack of social media use for work by all respondents, is the social structure used in respondents’ respective workplaces. A study by Jarrahi and Sawyer (2015) looked at the influence of the workplace social structure on knowledge practices and how that shaped the use of social technologies. When analyzing different consultant companies, the researchers found that companies that relied on extensive collaboration and/or encouraged a socially connected workplace had higher adoption rates of social technologies within the workplace (Jarrahi & Sawyer, 2015).

Conclusions and Further Research

This research is a good start to better understanding social technology usage perceptions in a professional setting; but for each question response, new avenues of research present themselves. Significant research should continue to determine the perception of social technology use within the workplace.

In light of the responses about using social media at work, there suggests a common negative perception of social media sites used for leisure. Though the perception may be towards social media sites as a whole, and not simply leisurely sites. More research is needed to distinguish between leisure social media sites, such as Facebook, Twitter, or YouTube, and professionally oriented social media, such as LinkedIn and Yammer.

The divide between small group social technologies, where communication is direct and focused on specific recipients, and large group social technologies, where communication is made available to any who wish to engage, was unexpected at the onset of this study, but warrants further analysis. Looking deeper into this dichotomy may reveal how perceptions of social technology in the workplace are dependent upon the technology's intended purpose, despite how it is being used professionally.

There is still a lot to be understood about social technologies and business interaction with social media. This study provides a glimpse into employee perceptions of social media in the workplace and how their opinion differs from the broader category of social technologies. From this research, it can be seen that Millennials and digital natives do prefer to supplement their communication with social technologies. Millennials and digital natives clearly see a distinction between the use of social technologies for professional tasks and the use of social media for workplace communication.

References

- Burrus, D. (2010). Social networks in the workplace: The risk and opportunity of Business 2.0. *Strategy & Leadership*, 38(4), 50-53. doi:10.1108/10878571011059674
- Facebook users worldwide. (2020). Retrieved from <https://www.statista.com/statistics/264810/number-of-monthly-active-facebook-users-worldwide/>
- Jarrahi, M. H., & Sawyer, S. (2015). Theorizing on the take-up of social technologies, organizational policies and norms, and consultants' knowledge-sharing practices. *Journal of the Association for Information Science & Technology*, 66(1), 162-179. doi:10.1002/asi.23161
- Khoir, S., & Davison, R. M. (2014). Applications of social media by digital natives in the workplace: An exploratory study in Indonesia. *New Zealand*, 1-9.
- Lim, V. K. G., & Chen, D. J. Q. (2012). Cyberloafing at the workplace: gain or drain on work? *Behaviour & Information Technology*, 31(4), 343-353. doi:10.1080/01449290903353054
- Rodríguez-Aceves, L., Madero, S., & Valerio-Ureña, G. (2018). Perceptions about the usefulness of online social networks in the workplace. *Percepción de La Utilidad Del Uso de Las Redes Sociales En El Lugar de Trabajo.*, 34(147), 149-157. doi:10.18046/j.estger.2018.147.2580
- Zhang, X., & Venkatesh, V. (2013). Explaining employee job performance: The role of online and offline workplace communication networks. *MIS Quarterly*, 37(3), 695-722. doi:10.25300/MISQ/2013/37.3.02

Appendix

Technology and Professional Communication

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1. What types of communication do you use for your job on a regular basis? Check all that apply.

- | | |
|---|---|
| <input type="checkbox"/> Email | <input type="checkbox"/> Social Media (Facebook or similar) |
| <input type="checkbox"/> Text | <input type="checkbox"/> Skype for Business |
| <input type="checkbox"/> Phone | <input type="checkbox"/> Face-to-face conversation |
| <input type="checkbox"/> Other (please specify) | |

2. What form of communication do you primarily use to communicate with your boss and coworkers?

- | | |
|--|--|
| <input type="radio"/> Email | <input type="radio"/> Social Media (Facebook or similar) |
| <input type="radio"/> Text | <input type="radio"/> Skype for Business |
| <input type="radio"/> Phone | <input type="radio"/> Face-to-face conversation |
| <input type="radio"/> Other (please specify) | |

3. When do you think it is appropriate to text or message your coworkers on social media (Facebook or others)? Check all that apply.

- Anytime
- Discussion about a project
- Casual conversation
- Emergency
- Never

4. When do you think it is appropriate to text or message your boss on social media (Facebook or others)? Check all that apply.

- Anytime
- Discussion about a project
- Casual conversation
- Emergency
- Never

5. Do you agree with the following statement? "Talking to someone face to face is always the best option in the workplace."

- Yes
- No
- Partially agree

Please explain why you made your selection above

6. Do you agree with the following statement? "Social media has no place in the workplace."

- Yes
- No
- Partially agree

Please explain why you made your selection above

7. Have you ever used Skype for Business (formerly Microsoft Lync)?

- Yes
- No

8. If you answered yes to the above question, what is your opinion of Microsoft Skype for Business (formerly Microsoft Lync)?

- Very satisfied
- Satisfied
- Neither satisfied nor dissatisfied
- Dissatisfied
- Very dissatisfied

Please explain why you made your selection above

9. What is your age?

- 18 to 24
- 25 to 34
- 35 to 44
- 45 to 54
- 55 to 64
- 65 to 74
- 75 or older

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FRAMING THE CONCEPT OF DATA ANALYTICS: HOW TO PREPARE INFORMATION SYSTEMS STUDENTS FOR THE BUSINESS ENVIRONMENT

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Abstract

The purpose of this paper is to discuss pedagogical techniques that can be used in designing course curriculum for a course in the fundamentals of data visualization for information systems students. Guidelines for structuring a reinforcing curriculum with examples are provided. Suggestions for using market leading software Tableau are included. Such a course can prepare students for entering the workplace and using data analytics in the business environment.

Keywords: Data Visualization, Data Analytics, Instruction, Tableau, Visualization Design

Introduction

Data Analytics is a core need in the industry today, as identified in the Graduate Management Admission Council's Corporate Recruiters Survey (2018). This need is supported by the emergence of a plethora of business intelligence tools for the industry. For students entering the workplace out of business schools, the ability to bridge the data scientist and decision-makers' gap is an essential skill set. The primary plank in that bridge is data visualization, which can take dense multi-layered data and create meaningful visual communications.

Students unfamiliar with the use of data are typically apprehensive in courses that are constructed on uncommon ground. To ground students in data literacy concepts, academics need to develop coursework related to real-world relevant problems. One way to create the coursework is to use the Constructivist Learning Theory (Hein, 1991). The theory acknowledges the need for individuals to utilize real-world examples in current learning. The use of relevant data to the student's current situation fulfills Lev Vygotsky's Zone of Proximal Development (Vygotsky, 1980). The utilization of appropriate data assignments enhances fundamental skills development that allows the student to solve problems independently. Also, the process enables potential development, where the student requires guidance and collaboration in problem-solving. To accomplish the method's goals, the EDGE (Explain, Demonstrate, Guide, and Enable) Instruction Method functions as the primary tool to enable visual communication learning, which stems from lean processes developed by Training in Industry practices (Huntzinger, 2002). When instructors use the EDGE method, they first explain the new skill and instruction goal. The instructors then perform a demonstration of the skill to seat the procedure and successful outcome in their minds. Next, the instructor actively guides the student through an exercise, so corrections are accomplished along the way to successful completion. Finally, the instructor challenges the student with a new similar task to enable the student to use the new skill successfully.

Purpose

The purpose of this paper is to share how visual communication instruction methods were used in a course based on data visualization in the spring of 2020 at a regional university in Texas. The ability to construct real-world scenarios that directly affected the student's understanding in the current period emphasizes the importance of bridging the gap between a set

of raw numbers and telling a story that ties together seemingly unrelated data streams. The developed course outcome is for the students to demonstrate their mastery of data literacy concepts and best visual communication practices utilizing Tableau, a leading industry business intelligence platform. Whether a student is majoring in management, marketing, accountancy, finance, or any other non-business related fields of study, the ability to be the bridge from complex datasets and the data scientists to decision making is a fundamental skill in today's workplace.

Tableau provides the framework for students who do not have a background in information systems and databases to understand data visualization theory and practices quickly. Many business students have a working knowledge of spreadsheet applications through coursework in accounting and economics.

The construction of coursework in visual communication with data visualization requires that academics continuously review the current data landscape for opportunities to ground students in relevant and meaningful data (Hein, 1991; Nestorov, Jukić, & Rossi, 2019). Nestorov et al. (2019) propose the requirements of a course with real-world scenarios, with prerequisites if students are more oriented to the data scientist roles. The practice also requires instructors to survey the current business landscape for the most appropriate tools and data and change accordingly.

Bridging the Gap

Organizations in the industry have become aware of the perceived need to gather large datasets of information in all aspects of their business. The process of collecting this information typically falls under data scientists' purview, who has a rich background in data analytics. Their skill sets include creating data models and algorithms for extracting relevant information from

the dense layers of data that an organization generates in its daily operations. These individuals are technically savvy. However, they typically do not have the business background to make decisions for the organizations. They create collections of facts that others must interpret.

Business analysts are vital to the organization. They are knowledgeable in the organization's business process and partner with the data scientists to create the datasets needed for monitoring by the organization's decision-makers. These individuals typically have experience in their business's niche areas and develop datasets for their particular area of expertise. Some organizations have these individuals utilize business intelligence software packages such as Tableau or Microsoft PowerBI. Other organizations rely upon trained individuals to create the bridge from dense data to understanding for the decision-makers. The skillset of creating visual communications is fast becoming a critical need for students in a wide variety of studies as they enter the business landscape.

Fundamental Principles

Organizations and decision-makers have distinct needs for understanding dense data. The fundamental principles of visual communication skillsets are vital for business intelligence. An individual's ability to design useful visualizations relies first on data literacy, meaning they must understand the data collected and how that data is related to the business problem. Ballard (2020) shows that managers in organizations readily utilize data to change how they make decisions when presented graphically rather than in tabular format. This ability to link various data together allows for greater use and understanding. Data literacy is needed to accomplish this task.

Data Literacy

Data literacy encompasses the knowledge of where the data comes from and the type of data provided from various sources. A designer must know if the information is ordinal, nominal, discrete, or continuous. If the source provides simple text, how should the kind of data be utilized or changed to fit the visualization needs? From this knowledge, the designers must understand the nature of how the intended audience best consumes data and the depths at which the intended recipient may want to delve into the fine details. The designer must consider the business model practices of an organization and the needs of the decision-makers.

An academic instructor should develop curricula that follow the model below in Figure 1 for courses that introduce students to the basic concepts and practices in data visualization. The model follows the typical process that most product management professionals adhere to in the industry (Barney, 2008).



Figure 1. Path of knowledge creation

Visual communication in itself is a product itself typically within an organization. However, these creations may be utilized for external purposes. Berinato (2016) recommends that designers ask two questions:

- 1) Is the information conceptual or data-driven?
- 2) Is the purpose of the visualization declaring or exploring something?

These questions create a four-quadrant model that aids in visualization design. In the figure below, four types of visual communication arise from the answers to these questions.

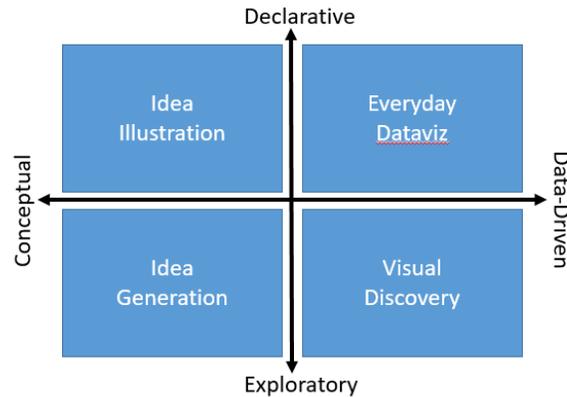


Figure 2 Visualization Design Model 6 (Berinato, 2019)

For most purposes, data analytics drives the process of visual communications toward the right side of the model encompassing Bernato's quadrants and their subdivisions(Berinato, 2019). Visual discovery is the primary need of most organizations. Course work should include assignments that ground the student minimally in this skill. The quadrant subdivision includes visual confirmation and visual exploration (Berinato, 2016, 2019).

Visual Confirmation

Visual confirmation allows for the confirmation of an assumption of a business problem to be proven to be true or not. In the process of graphic design, the individual will quickly iterate over concepts that allow for a deeper understanding of a large amount of data until one or two graphics allow for the answer to be told in a business story. Mathisen, Horak, Klokmoose, Grønabæk, and Elmqvist (2019) maintain that information by itself is useless unless accompanied by a narrative. Therefore, in this process, the designer must consider developing adjacent and narrative visual communication elements to relate the information to the audience.

The primary principle of the visual confirmation design process should accomplish three goals. First, reduce the time needed to gain insight. Then, increase the accuracy of the insights

from the data. Finally, it should improve the engagement of the decision-makers in the areas the data influences. The collection of needs will involve determining what decisions will be made from the collection of pertinent data. This action should be reflected in the lesson objectives and expected outcomes of the academic environment assignments. The design of practical exercises adheres to the three goals of the process mentioned previously to ground the student in relevant data and practices.

Visual Exploration

Visual exploration is more in the area of expertise of data scientists. However, with easy-to-understand tools, students should use an open-ended assignment to discover insights into more massive datasets. Typically, the exploration process is not involved with storytelling until evidence issues arise. The users and recipients then move to the confirmation process to deliver a business story.

Everyday DataViz designs are simple graphical presentations of data that individuals review frequently. They may include simple graphs like a control chart or heatmaps utilized in routine presentations of business stories. Unlike visual confirmations, these graphics affirm underlying assumptions of the daily operations of a business. These bits of visual communication are derived from the exploration and confirmation processes to become informative. The creation of these visualizations is a fundamental skill for students to derive more in-depth representations of data.

Next, the creation of a data model through collaborative processes with data analysts and data scientists occurs. The technology infrastructure of an organization determines the method of data collection. A determination is if the various sources of data answer the needs identified in the previous step. If not, the team identifies the methodology to collect or transform the data to

meet the intended recipient's needs. The process flows naturally into the data manipulation step. The third step of the model changes the data into the specific types and format needed from various sources into a concise form to meet the identified needs. Typically, this means filtering, sorting, discarding, and type classification of the tabular data. Data manipulation includes the building of relationships between different sets for a singular defined tabular form.

The visualization design step must follow the previous three steps as data is needed to create the visuals that answer the needs collected earlier. However, a creative process may be applied, but the designer or student must look to the necessary tasks that the recipient needs to accomplish when creating visualizations. Munzner (2014) classifies the general four as discovering, annotating, identifying, and comparing properties within the datasets. Fisher and Meyer (2017) identify Munzner's primary functions as finding and reading values, characterizing distributions, and identifying trends. Instructional design for the scenarios must mimic the business process needs and include practical exercises that address the primary functions.

Lastly, the publication of the visualizations ties back to the needs of the audience. Questions that must be answered in both assignments and businesses are: Does the audience need instant access outside of an organized review? What narrative is required to accompany the data to convey the story of the data to individuals not intimate with the information? At what frequency does the data need to be updated to be relevant to the recipient? In assignment design, these questions should be specified in the needs portion of the scenario. The questions guide reports, dashboards, and storyboards with the various tools determined for use in all organizations.

Procedures for Academic Course Creation

Determining course outcomes is essential to all else in the process of course development. For example, one may choose to have sufficient knowledge to gain industry certification, such as the Tableau Desktop Specialist. Another approach is to survey organizations that typically hire recent graduates to achieve current workplace requirements.

Once the course outcomes are determined, the instructor should construct related reports, dashboards, and stories to align with the learning objectives and course outcomes. The operation fulfills the first step in the Path to Knowledge Creation Model, as shown previously in Figure 1. The next logical step is to determine the data needed to satisfy the model's data needs determination portion. The Tableau Community for Higher Education provides coursework material for the fundamentals for use in Tableau; however, these may be adapted for other applications. Data.world and Kaggle.com both have repositories of data used to construct assignments under a general use license. Each lesson assignment should have a designated dataset that allows for accomplishing the section learning outcomes to meet the overall course goals. When considering a dataset, the instructor should include multiple sources to complete the model's data manipulation step, where sources are joined, unioned, filtered, and custom calculations are performed. Tableau provides a visual inspection tool in their Tableau Data Prep, where the data model is conceptualized, and the tabularized data is previewed. Skills building and reinforcement should be considered when developing the chronological order of assignments.

When developing coursework, the academic must show proficiency and a successful example (Altaf & Shahzad, 2018; Hein, 1991) as performed in the final step utilizing the EDGE method. Structuring design time within the course period allows the students to follow the

instructor through example exercises to create visualizations that accomplish the determined outcomes is critical before skills measurement assignments are used. This process enforces the visualization design step of the model.

Getting to Insights Faster

Examining five areas of analysis, as discussed previously by Mathisen, Horak, Klokmose, Grønabæk, and Elmqvist (2019), the first area asks, does the data needed to be ranked, ordered, sorted, or other statistical functions applied to it for consumption? When designing instruction for this area, the data analyst and the business process expert would need to devolve information into textual reports that do not utilize an "eye of the eagle" approach to data analysis. The older method involves manually comparing tabular data for outliers by text alone with no visual aids to correlate different results. The use of tabular datasets with conditional formatting allows designers to construct the most basic rules-based analysis concepts, as seen in Figure 3.

Number of Acres Burned By Fire Class

Fire Size Class	Fire Year									
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
A	14	82	358	355	219	410	188	286	300	270
B	23,134	7,572	22,623	17,911	12,013	23,943	9,613	11,868	9,474	9,869
C	94,059	24,945	102,679	63,538	38,230	88,206	22,888	23,909	19,735	24,966
D	81,077	22,801	108,927	52,559	37,119	91,642	19,137	10,958	15,809	20,315
E	133,282	32,588	160,121	82,291	45,953	159,141	26,139	11,042	11,622	31,786
F	219,843	41,069	283,343	144,022	60,610	424,411	28,843	13,677	31,173	54,572
G	1,301,344	5,976	805,365	197,119	44,057	2,710,972	56,306		55,731	66,983

Number of Acres Burned By Fire Class

Fire Size Class	Fire Year									
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
A	14	82	358	355	219	410	188	286	300	270
B	23,134	7,572	22,623	17,911	12,013	23,943	9,613	11,868	9,474	9,869
C	94,059	24,945	102,679	63,538	38,230	88,206	22,888	23,909	19,735	24,966
D	81,077	22,801	108,927	52,559	37,119	91,642	19,137	10,958	15,809	20,315
E	133,282	32,588	160,121	82,291	45,953	159,141	26,139	11,042	11,622	31,786
F	219,843	41,069	283,343	144,022	60,610	424,411	28,843	13,677	31,173	54,572
G	1,301,344	5,976	805,365	197,119	44,057	2,710,972	56,306		55,731	66,983

Figure 3. Tabular Data versus Conditional Formatting

(Generated in coursework)

The rules-based analysis allows the designer to construct criteria that bring attention to the information that meets or falls outside the determined conditions. The graphical requirements may be bolded, and colored fonts highlighted cell background or symbols to flag the out-of-specification criteria.

The dataset used in this example came from the 1.88 million wildfires file located on the data.world website. The site contains public use datasets under a general use agreement for registered users. The site institutes free registration. The ability to quickly determine the year and fire class that caused the most acreage destruction is illustrated in Figure 3, utilizing the heat map function in Tableau 2019.3. The simple setting of a scale of color ranging from grey for the lowest value to orange for the most considerable value in the data set allows the outlier to stand out. The table uses only data from Texas and the years 2006 through 2015.

Second, does the recipient need to answer questions of when an event or anomaly occurred and the associated trends of the found condition? A simple assignment of plotting sales of product lines over a period of time could be utilized with an analytical plot of the tendencies of each graph included, as seen in Figure 4. The data set used for this example comes from the Tableau for Higher Education example datasets provided by the organization for use in coursework for academic instruction of data visualization courses using Tableau. The site is available for general purpose use by joining their online community and verification of academic credentials.

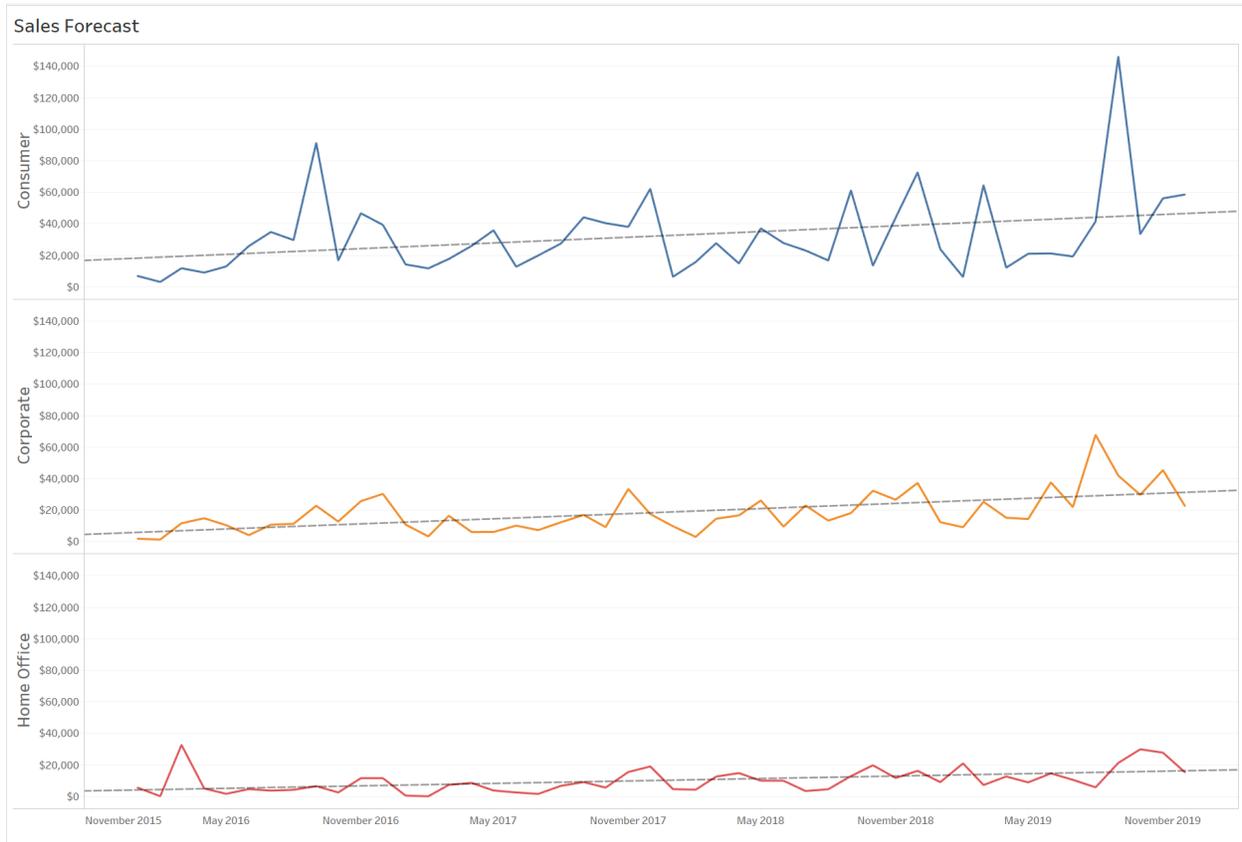


Figure 4. Tableau Example Sales Data with trendlines
(Generated in coursework)

Third, does the intended user need to know where in geo-spatial terms an event happened? An assignment that uses data points of wildfires as described in Figure 3 that occur in a year for a particular state found in Figure 5 is useful for grounding students into the meaningfulness of the information related to them. The exercise allows students to become familiar with the concept of using latitude and longitude concerning occurrences of events. The same criteria could be assigned to other data, such as sales or profits from Figure 4, if the locals are known.

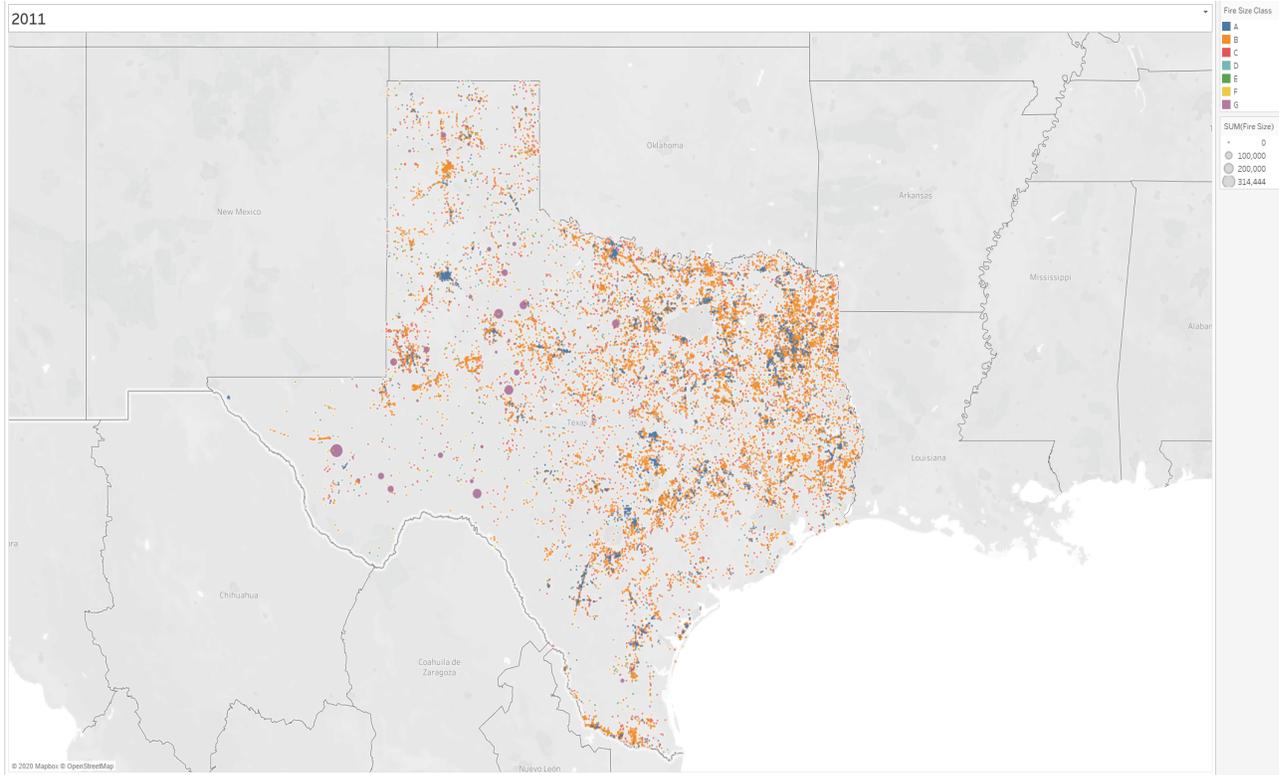


Figure 5. Geo-spatial visualization of Wildfires in Texas for 2011
(Generated in coursework)

Fourth, does the recipient need to understand what happened in terms of text-based examinations? The use of forecast "what if" scenarios are useful constructions to instruct in this area. For example, as seen in Figure 6, if there is a certain percentage of market churn, growth predictions may occur along product lines.

What if Forecast Based on All Sales (60% Growth, 6.40% Churn)

Region	Segment		Q2				Q1		
			April	May	June	Total	January	February	March
Central	Consumer	Sales	\$13,723	\$16,225	\$11,085	\$41,033	\$16,479	\$4,078	\$25,115
		Sales Forecast	\$20,552	\$24,299	\$16,600	\$61,451	\$24,679	\$6,107	\$37,612
	Corporate	Sales	\$6,138	\$19,682	\$8,575	\$34,395	\$13,060	\$1,712	\$9,330
		Sales Forecast	\$9,193	\$29,476	\$12,842	\$51,510	\$19,558	\$2,563	\$13,972
	Home Office	Sales	\$6,592	\$4,678	\$14,589	\$25,860	\$2,145	\$2,433	\$7,341
		Sales Forecast	\$9,872	\$7,006	\$21,849	\$38,727	\$3,212	\$3,644	\$10,994
Total	Sales	\$26,453	\$40,586	\$34,249	\$101,288	\$31,683	\$8,223	\$41,785	
	Sales Forecast	\$39,616	\$60,781	\$51,291	\$151,689	\$47,449	\$12,314	\$62,578	
East	Consumer	Sales	\$12,618	\$46,484	\$31,646	\$90,747	\$7,151	\$8,932	\$23,363
		Sales Forecast	\$18,897	\$69,614	\$47,392	\$135,903	\$10,710	\$13,376	\$33,490
	Corporate	Sales	\$15,146	\$7,411	\$12,680	\$35,238	\$13,505	\$4,784	\$12,777
		Sales Forecast	\$22,683	\$11,099	\$18,990	\$52,772	\$20,225	\$7,165	\$19,135
	Home Office	Sales	\$11,297	\$3,083	\$6,135	\$20,515	\$3,599	\$7,460	\$6,302
		Sales Forecast	\$16,918	\$4,618	\$9,187	\$30,723	\$5,390	\$11,172	\$9,438
Total	Sales	\$39,061	\$56,978	\$50,460	\$146,500	\$24,255	\$21,177	\$41,442	
	Sales Forecast	\$58,498	\$85,331	\$75,569	\$219,398	\$36,325	\$31,714	\$62,064	
South	Consumer	Sales	\$13,966	\$14,849	\$13,167	\$41,982	\$13,195	\$15,050	\$14,914
		Sales Forecast	\$20,915	\$22,238	\$19,719	\$62,872	\$19,760	\$22,539	\$22,336
	Corporate	Sales	\$15,588	\$11,695	\$28,861	\$56,145	\$3,950	\$2,257	\$10,972
		Sales Forecast	\$23,345	\$17,515	\$43,223	\$84,082	\$5,916	\$3,380	\$16,431
	Home Office	Sales	\$5,235	\$6,927	\$1,130	\$13,292	\$7,147	\$3,675	\$28,643
		Sales Forecast	\$7,839	\$10,375	\$1,693	\$19,907	\$10,703	\$5,503	\$42,896
Total	Sales	\$34,788	\$33,472	\$43,159	\$111,419	\$24,292	\$20,981	\$54,529	
	Sales Forecast	\$52,099	\$50,127	\$64,635	\$166,861	\$36,379	\$31,422	\$81,663	
West	Consumer	Sales	\$21,968	\$29,558	\$31,900	\$83,427	\$14,761	\$9,036	\$59,430
		Sales Forecast	\$32,900	\$44,267	\$47,774	\$124,940	\$22,106	\$13,533	\$89,002
	Corporate	Sales	\$15,412	\$17,730	\$10,811	\$43,954	\$3,724	\$7,474	\$34,445
		Sales Forecast	\$23,082	\$26,553	\$16,191	\$65,825	\$5,577	\$11,193	\$51,586
	Home Office	Sales	\$18,114	\$9,807	\$10,064	\$37,985	\$7,046	\$12,032	\$17,751
		Sales Forecast	\$27,127	\$14,687	\$15,072	\$56,886	\$10,553	\$18,019	\$26,584
Total	Sales	\$55,494	\$57,096	\$52,776	\$165,366	\$25,531	\$28,542	\$111,626	
	Sales Forecast	\$83,108	\$85,506	\$79,037	\$247,651	\$38,236	\$42,745	\$167,171	
Grand Total	Sales	\$155,797	\$188,131	\$180,643	\$524,572	\$105,761	\$78,923	\$249,383	
	Sales Forecast	\$233,322	\$281,746	\$270,532	\$785,599	\$158,388	\$118,195	\$373,476	

Figure 6 "What-If" scenario graphic of Tableau Sales data by region and product line
(Generated in coursework)

Finally, does the user need to understand the interactions of "with whom" the incident correlated? The use of information determines how a set of conditions affect a demographic is useful as an assignment. The purpose of the data surrounding deaths associated with the opioid crisis in the United States addresses this area when used with demographic visualizations, as seen in Figure 7. The information comes from the Opioid Crisis Data set found on data.world site. The graphic shows a heatmap for 2009, the year of most deaths in the dataset, and the breakdown of the information by race and gender, as determined at the time of data collection.

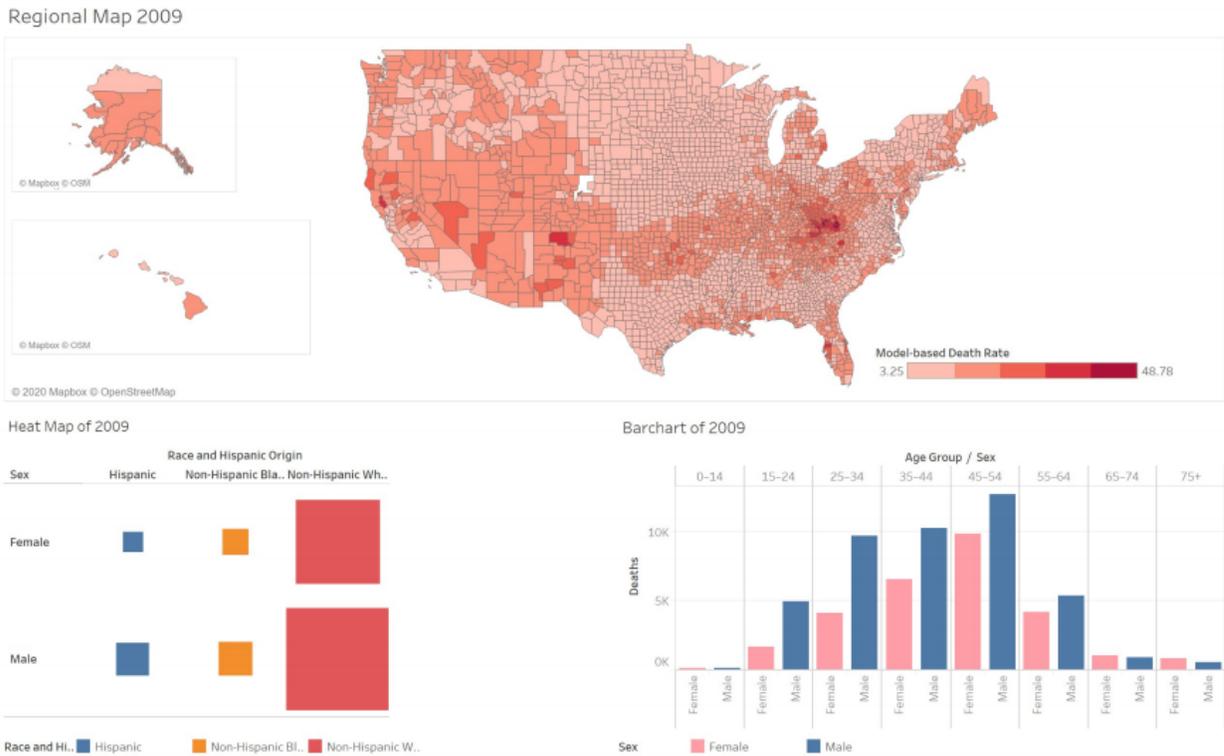


Figure 7. Deaths related to opioid use (Generated in coursework)

Increase Accuracy of Insights

The design of data visualizations allows for the consumption of multidimensional data in a flattened state. At the same time, we allow for insights faster by providing an overhead view of large amounts of data. The visual confirmation or exploration concepts require individuals to dig deeper once they have identified unique information. Therefore, drill-down tooltips or graphics are needed to gain a deeper understanding of the initial insight. An example of this would be designing county-level information as an expansion tooltip for a heatmap of SARS-2 COVID-19 cases with demographic data. The information should refer back to sources used to create the initial visualization and provide useful adjacent details for confirmation. For example, Figure 8's

graphics are derived from the public-facing site from John Hopkins University for tracking SARS-2 COVID-19.

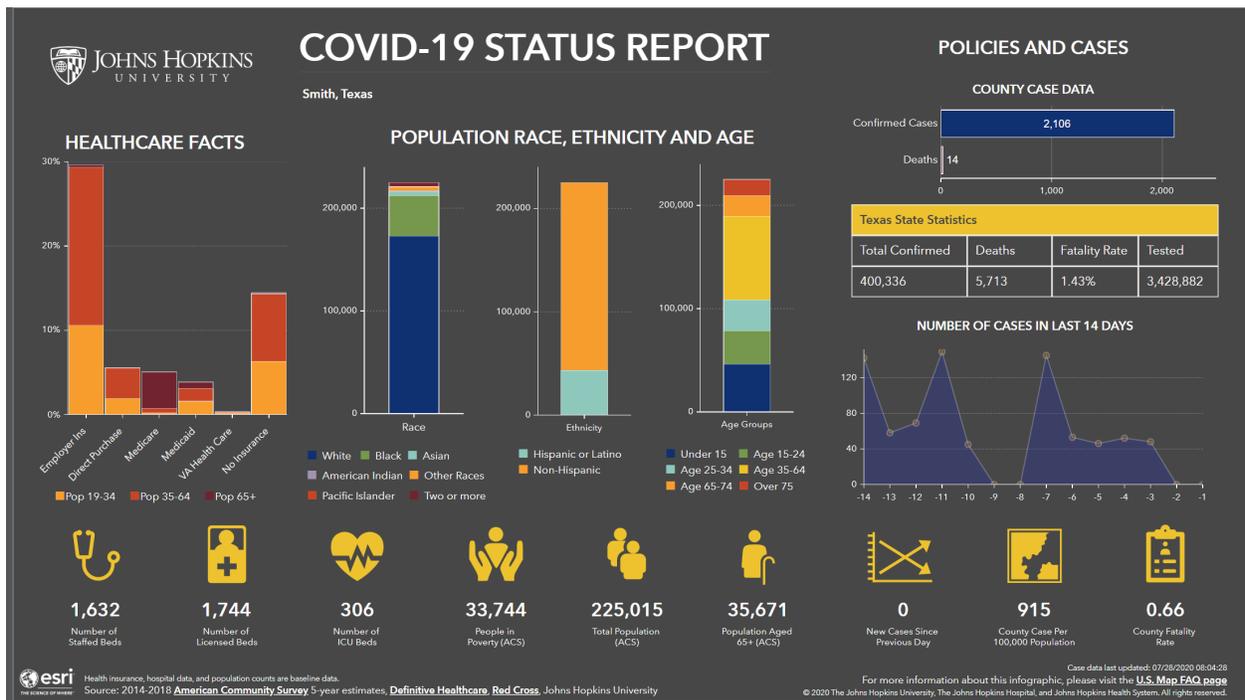
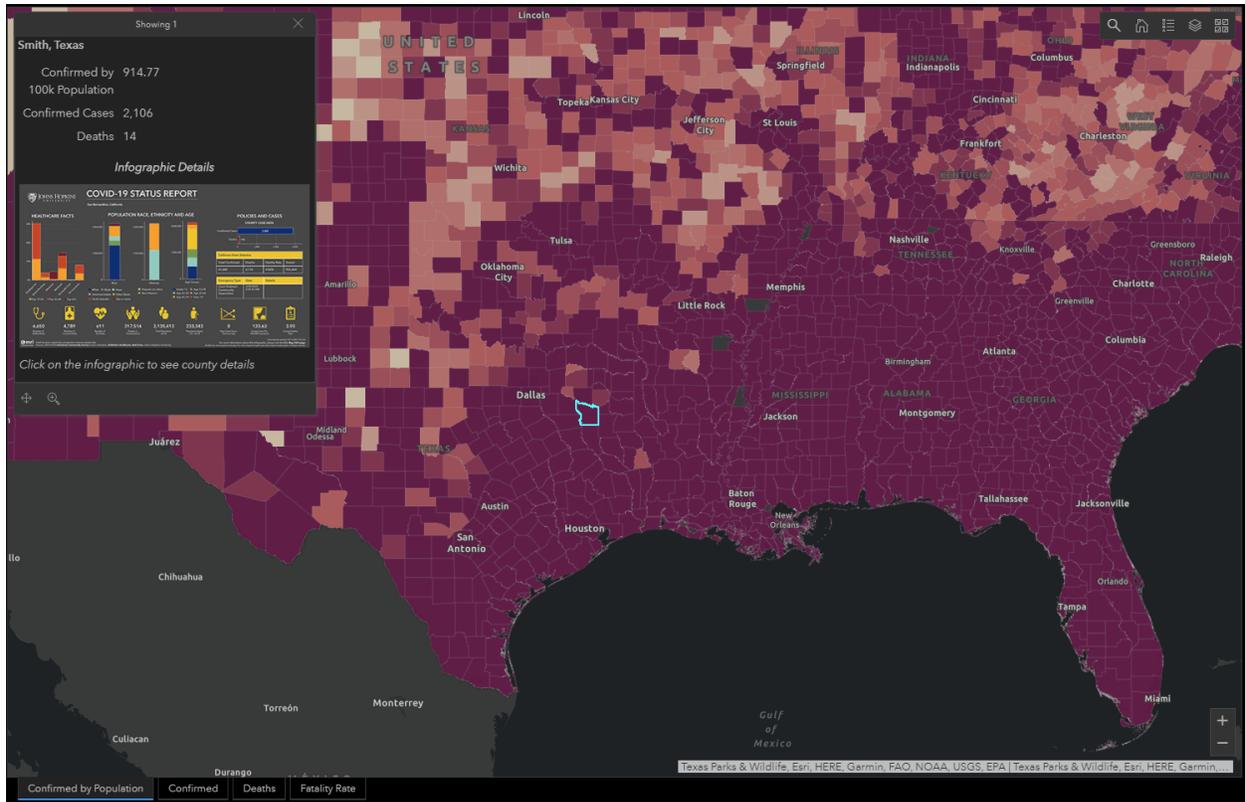


Figure 8 SARS- 2 – Cov19 County Statistics <https://coronavirus.jhu.edu/us-map>

Improve Engagement

Depending on the business intelligence tool an organization adopts, the designers must create reports and dashboards at a minimum. The creation of storyboards may fall outside the capability of their tool. However, the ability to increase engagement of decision-makers or stakeholders lies in distributing the insights quickly. The construction of a narrative to support the visualization provided in Everyday Vids and Confirmation designs is necessary for improving engagement. A narrative may consist of video, text, or voice recordings and easily accessed from the visualization's publication media.

An example of this may be the review of data that follows an organization's business logic, such as a graphic that displays information on chemical analysis of athletes' urines for banned substances according to standards set by the World Anti-Doping Association. Reviewers of data from various organizations must quickly determine if the insights into a group of athletes adhere to its rules. If not, is there supportive evidence that shows what substance falls outside the defined boundaries, with confirmations of presence? The information must be available in various centers in a secure manner for agreement. Therefore, the use of reliable electronic publications without the ability to change data is necessary.

In designing curricula to improve engagement, the use of private and public spaces should be used. Tableau for Higher Education provides the service of a private, secure area of publishing visualizations in an instance of Tableau Server designated for an instructor registered course, just as an organization would have. Tableau Public, a free limited service for designing and publishing visualizations for general consumption, is available to any registered user at public.tableau.com.

Table 1 provides recommendations for the flow of assignments, objectives, and functional outcomes.

Task	Objective	Functional Outcomes	Visualization Goal
Data Preparation	Data literacy	Joins Unions Filtering Relationships Custom Calculations	Getting to Insights Faster
Information Grids	Data inspection	Sorting Ordering Filtering Heatmaps	Getting to Insights Faster
Charting	Time Point Identification	Line Charts Bar Charts Relationships Filtering Tooltip enhanced information	Getting to Insights Faster Increase Accuracy of Insights
Dual – Axis Charting	Time Point Identification Comparisons	Line Charts Bar Charts Relationships Filtering	Getting to Insights Faster Increase Accuracy of Insights

		<p>Tooltip enhanced information</p> <p>Data Normalization</p>	
Analytics	Statistical Analysis	<p>Trends Analysis</p> <p>Forecasting</p> <p>Cluster analysis</p> <p>Reference Bands</p> <p>Averages</p> <p>Medians</p>	<p>Getting to Insights</p> <p>Faster</p> <p>Increase Accuracy of Insights</p>
Geo-spatial maps	Location Mapping	<p>Location mapping</p> <p>Size Comparisons</p> <p>Relationships</p> <p>Heatmaps</p>	<p>Getting to Insights</p> <p>Faster</p> <p>Increase Accuracy of Insights</p>
Dashboards	Data Relationships	<p>Formatting</p> <p>Data Arrangement</p> <p>Relationships</p> <p>Data Confirmation</p> <p>Analysis</p>	<p>Getting to Insights</p> <p>Faster</p> <p>Increase Accuracy of Insights</p> <p>Improve Engagement</p>
Interactive Dashboards	Data Relationships	<p>Relationships</p> <p>Filtering</p> <p>Custom Calculations</p> <p>Formatting</p>	<p>Getting to Insights</p> <p>Faster</p> <p>Increase Accuracy of Insights</p>

			Improve Engagement
Storyboards	Dashboard	Relationships	Getting to Insights
	Relationships	Filtering	Faster
		Custom Calculations	Increase Accuracy of
		Formatting	Insights
	Narrative Creation	Improve Engagement	
Publishing	Knowledge	Data security	Getting to Insights
	Sharing	Permission-based	Faster
		sharing	Increase Accuracy of
		Public information	Insights
	regulations	Improve Engagement	

Table 1 Recommended Course Development Criteria

Recommendations

The design of curricula for data visualization instruction is attainable using the knowledge creation model and focusing on the Visualization Design Model's right side, as shown in Figure 2. Though a background in data analytics is not required to utilize Tableau's tools, Microsoft Excel or spreadsheets' knowledge is suggested. When considering the current tools for use in a course, academic instructors should view the available material that allows for the development of course material that accomplishes the three data visualization goals of decreasing time to insights, increasing the accuracy of insights, and improving decision-makers' engagement. These three goals should be achieved using the five areas of data analysis.

Relevant course applications. The instructor should include materials that are relatable and not abstract to the students. This selection of meaningful material to students drives a deeper understanding of the skillsets taught. In doing so, the coursework will allow institutes of higher education to fulfill the industry's need to create graduates proficient in the basics of data and business analytics.

Using models discussed earlier, as the instructor designs the course ample time, the instructor can first demonstrate the concept, have students work through an example with the instructor, and then develop a related problem. Activities should be included from the simple exercises that get to insights faster, to those that increase the accuracy of insights and finally to the more complex activities that improve engagement, such as dashboards.

It helps a learning situation if students can relate to the data other than as a set of numbers. For example, any extensive database could be used to create data visualizations. However, if students can connect to the data, they will find it more relevant, and if they are interested, they are more likely to become and stay engaged. For example, data on sales of life insurance policies might be useful business data, but data related to alcohol sales might be more interesting to traditional-age college students. In turn, timely data could also be of interest to students, such as studying data related to Covid-19 during the pandemic.

A concluding project could ask students to select a set of data from three to five databases and ask them to create a complete range of charts from getting to insights faster, increasing the accuracy of insights, and improving engagement. The instructor could set up judging teams where three other students would determine the project results' accuracy and effectiveness. The teams will then provide feedback on the assignment to the instructor.

Effectiveness of course design. The process outline in this paper was shown to be effective by student reviews of the developed course. The capstone assignment required the students to find their business problems from publically available datasets and build their reports, dashboards, and storyboards. Each student achieved a superior assessment by peer and academic critique. One student completed his Tableau Desktop Certified Associate credentials. Another student's course review comments stated that they were unsure of taking the class at the beginning of the semester. However, they could use the skills learned in the course to assist in their current economics coursework. They felt that using the course's skillsets allowed them to be more successful in other course work.

Further, work in academic coursework development should involve a detailed analysis of individual assignments and instruction success. Direct measurements of students' perceived skills and satisfaction and certification testing results should guide coursework development. These skills are critical to the students entering the workforce in the twenty-first century (Vista, 2020). Using market-leading platforms such as Tableau, universities can better prepare students for a competitive workplace.

References

- Ballard, A. (2020). Promoting performance information use through data visualization: evidence from an experiment. *Public Performance & Management Review*, 43(1), 109-128.
- Barney, S., Aurum, A., & Wohlin, C. (2008). A product management challenge: Creating software product value through requirements selection. *Journal of Systems Architecture*, 54(6), 576-593.
- Berinato, S. (2016). Visualizations that really work. *Harvard Business Review*, 94(6), 93-100.
- Berinato, S. (2019). *The Harvard Business Review Good Charts Collection: Tips, Tools, and Exercises for Creating Powerful Data Visualizations*: Harvard Business Press, Cambridge, MA

Fisher, D., & Meyer, M. (2017). *Making data visual: a practical guide to using visualization for insight*: O'Reilly Media, Inc., Boston, MA

Graduate Management Admission Council, Corporate Recruiter Survey Report: Retrieved From <https://www.gmac.com/market-intelligence-and-research/research-library/employment-outlook/2018-corporate-recruiters-survey-report>

Hein, G. (1991). Constructivist learning theory. *Institute for Inquiry*. Available at: <http://www.exploratorium.edu/ifi/resources/constructivistlearning.html>.

Huntzinger, J. (2002). The roots of lean. *Training Within Industry: The Origin of Kaizen, Association for manufacturing Excellence*, 18(2), 14-23.

Mathisen, A., Horak, T., Klokmose, C. N., Grønbaek, K., & Elmqvist, N. (2019). *InsideInsights: Integrating Data-Driven Reporting in Collaborative Visual Analytics*, *Computer Graphics Forum*, 38(3), 649-661

Munzner, T. (2014). *Visualization analysis and design*: CRC press, Boca Raton, FL

Nestorov, S., Jukić, N., & Rossi, S. (2019). Design and Implementation of a Data Visualization Course with a Real-World Project Component in an Undergraduate Information Systems Curriculum. *Journal of Information Systems Education*, 30(3), 202.

Vista, A. (2020). Data-Driven Identification of Skills for the Future: 21st-Century Skills for the 21st-Century workforce. *SAGE Open*, 10(2), 2158244020915904.

Vygotsky, L. S. (1980). *Mind in society: The development of higher psychological processes*: Harvard university press, Cambridge, MA

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IMMERSIVE TECHNOLOGIES: A REVIEW OF USE IN K-16 EDUCATION AND BUSINESS

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Abstract

Immersive technologies, such as virtual reality (VR) and augmented reality (AR), have become popular as a customer experience tool for many businesses. This article will provide an overview of how businesses are currently using immersive technologies and how K-16 education is implementing VR and AR in the classroom. As immersive technologies rise in popularity in the K-12 setting, college students may anticipate their use in college classes as well. As such, this is a trend higher education faculty should be aware of and consider their willingness to incorporate VR or AR into their learning experiences to ensure our students are prepared to use the tool when entering the workforce. Examples of business use of immersive technologies will be provided as well.

Keywords: Augmented reality, virtual reality, immersive technology

Introduction

Virtual and augmented reality are technologies that immerse users in a simulated altered environment. These immersive technologies continue to grow in popularity in a variety of different areas from education, to the workplace, and to marketing. Augmented and virtual reality are related, but there are distinguishing differences between the two. Virtual reality (VR) requires specialized equipment in order to fully immerse users in a different environment that is computer generated. Alternatively, augmented reality (AR) utilizes common devices, such as a

smartphone, so that users can experience a new environment without being fully immersed in it. While utilizing AR, users are still aware of their surroundings; however, this is not the case with VR (“Virtual and Augmented Reality,” 2019). While there are differences between these two common immersive technologies, both can influence the perceptions of users and allow for unique encounters.

Businesses are beginning to see the value of using various types of immersive technologies in their operations. Many of these businesses are utilizing the technology to create human-machine interfaces, improve communication, train for safety, and provide a virtual travel environment (Roe, 2018). Although many of these technologies are still in the early stages of development, uses are expected to increase dramatically in the near future. The potential seems to be endless: medical training, customizing products, repairing equipment, virtual tours, logistics designs, and entertainment (Paine, 2018).

Due to the rise of immersive technologies in everyday life, it is not surprising that innovative teachers are incorporating immersive experiences into the classroom. New approaches to teaching with this technology help to foster collaboration, imagination, and innovation because of enhanced student participation (Rodriguez, 2020). Since students today may become designers or users of these technologies tomorrow, it is essential to properly prepare them for the technologies they will encounter. According to Prust (n.d.), “As VR technology advances, its use and integration in schools will increase, allowing students to experience firsthand physical context for what they could previously only read about” (para. 3). Similarly, utilizing AR can improve the learning environment by enhancing positive attitudes in students (Altinpulluk, 2019). Immersive technologies can be used to help students establish connections between class concepts and life or career situations. By including AR in the classroom, students

can "...shrink mountains to fit in a room, have airplanes float above desks and rip products apart without physically seeing them" (Fade, 2019, para. 15).

Technology was previously a barrier to the utilization of immersive technologies. However, as the necessary equipment becomes more readily available and cost effective, usage statistics will likely change. AR activities that utilize smartphones can more easily be incorporated into classes given the rise of smartphone ownership among students. The Center for Generational Kinetics (2018) found that 95% of students aged 13 to 22 had a smartphone. To take advantage of this, there are numerous apps that exist to help teachers in creating immersive experiences for students. Some examples include Elements 4D, AugThat, Math alive, and ZooKazam ("Augmented Reality in Education," n.d.).

As immersive technologies continue to grow in popularity, educators need to find innovate ways to incorporate the technology into lesson plans and classes in order to engage students. However, one study found that a key obstacle university instructors face when attempting to incorporate immersive technology into classes is limited instructional design, research, and training to effectively utilize the technology (Barroso-Osuna, Gutierrez-Castillo, Liorente-Cejudo, & Ortiz, 2019). When investigating immersive technology's prevalence in business education, the results are concentrated on the use of simulations. However, due to the availability of a variety of emerging technologies, additional opportunities exist. The purpose of this study was to investigate how immersive technologies are being used in K-12, higher education, and business settings and to identify related implications for educators.

Immersive Technology in Education

AR has been readily used in education in very simple forms such as scanning a QR code with a smartphone. Blum (2018) noted that textbooks often include QR codes, worksheets, and

flashcards for students to scan in order to supplement course material. Similarly, QR codes on posters can be scanned in order to view animated scenes to enhance learning (Chaykowski, 2018).

Although incorporating new technologies is often viewed as a way to engage students, there is a lack of research studies investigating the validity of such a claim. Sirakaya and Cakmak (2018) conducted a study of 118 seventh graders in science and technology classes in Turkey. The quantitative study found increased achievement; however, there was no change in student engagement. An interesting finding of this study was that students preferred utilizing the technology individually as opposed to using it in group settings.

Altinpulluk (2019) performed a literature review and found 58 articles on the topics of immersive technology, VR, and AR published between 2006 and 2016 in the Social Science Citation Index. The majority of the articles found were from studies in Asia and only approximately 14% were conducted in the United States. Based on this literature review, Altinpulluk (2019) found that immersive technologies were most often included in science classes and utilized mobile devices such as smartphones.

One popular program that is used in K-12 educational settings is Flipgrid. This program allows AR videos to be created and scanned with a smartphone. Ark (2019) reported that “one in three U.S. teachers use Flipgrid” (para. 2). Using Flipgrid, QR codes are created when a video is recorded. Then, once the QR code is scanned, the video will appear to pop out and float. Utilizing Augmented Reality in the classroom allows for students to view learning in a layered format. The Augmented Reality option places the content in such a way that students can still review other objects in the room. As an educator, this allows for various activities to be offered in an engaging way that adds creativity and innovation. This method may also be appealing from

the student perspective as it mirrors a gaming simulation. The Flipgrid website touts that the program can be used at various educational levels, from preschool to graduate school. This statement, in addition to its prevalence among teachers, suggests that college students may have previous experience using Flipgrid (Microsoft, 2019).

A 2016 survey of U.S. schools found that only 5% of teachers say they are using some type of immersive technology. In the same study, more computer science (11%), technology (11%), and science teachers (9%) have found a use for such technology in the classroom (Project Tomorrow, n.d.). However, in 2018, Levine commented that “Immersive technologies such as virtual reality and 3D scanning are becoming so hot that educators across the country are beginning to roll them out for students of all ages” (para. 1). As the software becomes more readily available, usage statistics are likely to increase. With so many individuals owning smartphones, it is easier to incorporate this into the classroom experience. There are many apps already available to aid in various teaching activities such as Elements 4D, AugThat, Math alive, and ZooKazam (“Augmented Reality in Education,” n.d.). There are also easy tools to help instructors create their own experiences, such as Augment, ZVR, and Blippar (“Augmented Reality in Education,” n.d.).

AR has many applications in everyday life. Gaming is likely the most common as shown through the popularity of Pokemon GO, which allowed for real-world interactions with others (Chaykowski, 2018). Applications are also being developed as tutorials that provide a digital overlay of a project to guide the user through a process (Chaykowski, 2018). AR could also replace “googling” for information or reading signs. Instead, users can scan a code on their phone, which then projects a bubble that provides the needed information (Chaykowski, 2018). Immersive technologies are likely to be common applications that many will be expected to use,

but the education systems seem to be lagging in the ability to prepare future employees and consumers for this level of technology integration.

Immersive technologies have the ability to drastically change the learning environment for students because they allow the hands-on learning that more traditional classrooms lack. For example, if students use AR during an art gallery display, the students can view the art work at the same time as viewing a video explaining the art process. This simultaneous display will help with engagement and retention of the content. Students are often comfortable with the technology because they may be using it for entertainment already. According to Blum (2018), AR can be easily integrated into classrooms by using the AR examples provided with the course textbook. Students easily scan the code with a laptop or smartphone to receive a short summary of what is included. Extending this method, students can use AR-enabled worksheets to work on their own time. A literature review of published AR studies found, according to Yuliono, Sarwanto, and Rintayati, “AR enhances learners’ outcomes, pedagogical processes, and interactions either among student-student, teacher-student, or student-material” (2018, p. 130). As educators and students become more comfortable with its use, AR can be used to allow hands-on demonstrations that may be too restrictive, expensive, or dangerous in a classroom setting.

After testing several education assignments using AR, Cuendet, Bonnard, Do-Lenh, Dillenbourg (2013) point out that what works in a lab setting does not always work in a classroom setting. They provide suggestions when implementing its use in the classroom:

- Integration – an AR activity is but one piece in several different activities
- Empowerment – instructors should be able to maintain some control over the activity among the distractions that are present
- Awareness – the instructor should remain aware of all students’ progress during the activity

- Flexibility – instructors should have the ability to alter the activities as unexpected events occur
- Minimalism – only the least amount of information should be shared with learners to guard against information overload.

Use in K-12

There are a variety of reasons why AR has become trendy in K-12 educational settings. According to Sirakaya and Cakmak (2018), “As well as being easy to use, AR has succeeded in attracting attention in terms of its use in education, thanks to its pedagogical benefits. It is observed that AR tools are used by a broad range of participants, from pre-school students to post-graduate students and teachers in a wide range of fields, from literacy education to astronomy education” (p. 298).

In a 2016 survey of U.S. schools, approximately 5% of teachers reported using immersive technology; however, there were differences based on the subjects taught. More computer science, technology, and science teachers reported using immersive technologies in their classrooms (Project Tomorrow, n.d.). Since then, noticeable shifts in AR use in education have occurred. For example, in 2018 Levine noted that “Immersive technologies such as virtual reality and 3D scanning are becoming so hot that educators across the country are beginning to roll them out for students of all ages” (para. 1). The increased stimulation from using immersive technologies helps to more effectively attract and keep attention (Rodriguez, 2020). A more attentive student will be more engaged and, hopefully, stay on task longer and retain the information longer.

Use in Higher Education

A literature review of articles concerning AR in education settings found only 18 articles from three databases, and only 12 of these were research based. Of these, 10 were based on university-level students. It is believed this is because these students are more available to

university researchers, who are more likely to publish findings (Yuliono, Sarwanto, & Rintayati, 2018).

Sural (2018) conducted a study on university students in Turkey studying to be teachers. When asked about their perceptions of the use of AR in the classroom, aspiring teachers “are very excited and stated that augmented reality has big potential use in teaching and learning materials. Also, they stated that they wanted to see AR technology in their lessons and learning environments.” (p. 574).

Use in Business Settings

As immersive technology continues to rise in popularity, business uses are projected to increase dramatically in coming years as well. Marengo, Pagano, and Ladisa (2018) noted that “companies spend more money in e-learning training, always looking for more engaging and motivating experiences for the employees. In fact, workers’ productivity has been revolutionized by the increasing use of mobile devices on the job” (p. 129) due to the availability of personal devices. Technology is often used by companies in training activities due to safety issues and in order to simulate complex situations (“Virtual and Augmented Reality,” 2019). In addition, industrial work settings are utilizing immersive technologies whereby employees use AR instead of paper manuals. Fade (2019) explained that “technicians in the field will be able to receive live support from remote staff, who can indicate markings, point out issues, superimpose models over items like vehicle engines and the like, and more” (para. 6).

A study of executives conducted by Oracle, and cited by Hunting (2019), shows the top uses of AR include employee training and product demonstrations for customers. AR seems to be the preferred choice for many businesses because it blends the virtual with the real world and “does not sever the user’s connection with their environment” (Tredinnick, 2018, p. 79). This

positive aspect of AR allows for more social interaction and helps to build collaboration in the workplace. Another positive aspect is that AR is hands-free, which prevents interruption in work. Suggested uses include manufacturing, maintenance, design, and virtual meetings (Tredinnick, 2018).

Numerous examples of businesses utilizing immersive technologies are available. For example, to promote its reputation for entertainment, the city of Los Angeles uses VR to promote tourism (Kapko, 2017). One way this is done is for tourists to try trails in the city parks. However, tours do not have to be limited to leisure. Real estate agents can use the same software for virtual home tours (Hunting, 2019). In addition, rent-to-own furniture and appliance company Rent-A-Center has also found a way to use AR. Through technology, customers can take tours of showrooms (Kapko, 2017).

Implications and Conclusion

Immersive technologies are being used in a variety of settings ranging from preschools to corporations. AR and VR seem to be more widely used in the K-12 setting, though use in the business setting is growing as well. Some college educators have sought to incorporate the technologies into their classes to engage students utilizing platforms they may have experienced in their K-12 educational experience. However, scholarly research on the outcomes is limited, so this is an area where future research is needed. Future research is also needed to help develop effective training so that educators and students feel comfortable using immersive technologies, which will likely lead to its increased use.

References

Altinpulluk, H. (2019). Determining the trends of using augmented reality in education between 2006-2016. *Education and Information Technologies*, 24, 1089-1114. Doi: 10.1007/s10639-018-9806-3

- Ark, T. V. (2019, July 1). *Teachers flip over Flipgrid*. Retrieved from <https://www.forbes.com/sites/tomvanderark/2019/07/01/teachers-flip-over-flipgrid/#757fbc4641a>
- Augmented reality in education. (n.d.). Retrieved from <https://thinkmobiles.com/blog/augmented-reality-education/>
- Barroso-Osuna, J., Gutierrez-Castillo, J. J., Liorente-Cejudo, M. C., & Ortiz, R., V. (2019). Difficulties in the incorporation of augmented reality in university education: Visions from the experts. *Journal of New Approaches in Educational Research*, 8(2), 126-141. Doi: 10.7821/near.2019.7.409.
- Blum, A., (2018, August 16). *The multiple uses of augmented reality in education*. Retrieved from <https://www.emergingedtech.com/2018/08/multiple-uses-of-augmented-reality-in-education/>
- The Center for Generational Kinetics (2018). *The state of Gen Z 2018*. Retrieved from <https://genhq.com/generation-z-research-2018/>
- Chaykowski, K. (2018, March 8). Six ways augmented reality will matter beyond puppy selfies. *Forbes*. Retrieved from Business Source Complete.
- Cuendet, S., Bonnard, Q., Do-Lenh, S., & Dillenbourg, P. (2013). Designing augmented reality for the classroom. *Computers & Education*, 68, 557-569. Doi: 10.1016/j.compedu.2013.02.015
- Fade, L. (2019, February 6). *Augmented reality in business: How AR may change the way we work*. Retrieved from <https://www.forbes.com/sites/theyec/2019/02/06/augmented-reality-in-business-how-ar-may-change-the-way-we-work/#74b669a351e5>
- Hunting, B. (2019, August 20). *Augmented reality study shows big business impact in customer experience*. Retrieved from <https://smartercx.com/augmented-reality-study-shows-big-business-impact-in-customer-experience/>
- Kapko, M. (2017, May/June). Making waves with immersive technologies. *CIO*, 14-20. Retrieved from https://images.idgesg.net/assets/2017/05/ciod_may_jun.pdf
- Levine, E. (2018, September 13). *4 Ways K-12 can maximize the impact of immersive technology in the classroom*. Retrieved from <https://edtechmagazine.com/k12/article/2018/09/4-ways-k-12-can-maximize-impact-immersive-technology-classroom>
- Marengo, A., Pagano, A., & Ladisa, L. (2018). Towards a mobile augmented reality prototype for corporate training: A new perspective. *14th International Conference Mobile Learning*. 129-135.
- Microsoft. (2019). Retrieved from <https://info.flipgrid.com/>

- Nagel, D. (2017, April/May). Gauging enthusiasm for augmented & virtual reality in education. *T.H.E. Journal*, 34.
- Paine, J. (2018, May 30). *10 Real use cases for augmented reality*. Retrieved from <https://www.inc./james-paine/10-real-use-cases-for-augmented-reality.html>
- Project Tomorrow (n.d.). *Augmented and virtual reality in K-12 education: Current status and aspirations*. Retrieved from <https://tomorrow.org/speakup/speak-up-2016-augmented-and-virtual-reality-in-k12-education-april-2017.html>
- Prust, T. (n. d.). *6 Ways virtual reality is changing business and education*. Retrieved from <https://ccbtechnology.com/virtual-reality-changing-business-education/>
- Rodriguez, R. V. (2020, April 28). Augmented reality and the future of education. Retrieved from <https://analyticsindiamag.com/augmented-reality-and-the-future-of-education/>
- Roe, D. (2018, October 23). *6 Ways businesses are using augmented and virtual reality today*. Retrieved from <https://www.csmwire.com/digital-workplace/6-ways-businesses-are-using-augmented-and-virtual-reality-today/>
- Sirakaya, M., & Cakmak, E. K. (2018). The effect of augmented reality use on achievement, misconception and course engagement. *Contemporary Educational Technology*, 9(3), 297-314. Doi: 10.30935/cet.444119
- Sural, I. (2018). Augmented reality experience: Perceptions of higher education students. *International Journal of Instruction*, 11(4), 5650576.
- Tredinnick, L. (2018). Augmented reality in the business world. *Business Information Review*, 35(2), 77-80. Doi: 10.1177/026638211878335
- Virtual and augmented reality (2019). Retrieved from Gale Opposing Viewpoints Online Collection.
- Yuliono, T., Sarwanto, & Rintayati, P. (2018). The promising roles of augmented reality in educational settings: A review of literature. *International Journal of Educational Methodology*, 4 (3) 125-132.

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