

Author: Daniels, Nathan J.

Title: *The Role of Information Technology Education within the Current Secondary Level Information Communication Technology Education Program in Wisconsin*

The accompanying research report is submitted to the University of Wisconsin-Stout, Graduate School in partial completion of the requirements for the

Graduate Degree/ Major: MS Career and Technical Education

Research Advisor: Urs Haltinner, Ph.D.

Submission Term/Year: Spring 2019

Number of Pages: 94

Style Manual Used: American Psychological Association, 6th edition

- ☒ I have adhered to the Graduate School Research Guide and have proofread my work.
☒ I understand that this research report must be officially approved by the Graduate School.
 Additionally, by signing and submitting this form, I (the author(s) or copyright owner) grant the University of Wisconsin-Stout the non-exclusive right to reproduce, translate, and/or distribute this submission (including abstract) worldwide in print and electronic format and in any medium, including but not limited to audio or video. If my research includes proprietary information, an agreement has been made between myself, the company, and the University to submit a thesis that meets course-specific learning outcomes and CAN be published. There will be no exceptions to this permission.
☒ I attest that the research report is my original work (that any copyrightable materials have been used with the permission of the original authors), and as such, it is automatically protected by the laws, rules, and regulations of the U.S. Copyright Office.
☒ My research advisor has approved the content and quality of this paper.

STUDENT:

NAME: Nathan Daniels

DATE: 5/8/2019

ADVISOR:

NAME: Urs Haltinner

DATE: 5/8/2019

This section for MS Plan A Thesis or EdS Thesis/Field Project papers only

Committee members

- | | |
|--------------------------------------|-----------------------|
| 1. CMTE MEMBER'S NAME: Kathy Brock | DATE: 5/8/2019 |
| 2. CMTE MEMBER'S NAME: Amy Gullixson | DATE: 5/8/2019 |
| 3. CMTE MEMBER'S NAME: | DATE: |

This section to be completed by the Graduate School

This final research report has been approved by the Graduate School.

Director, Office of Graduate Studies:

DATE:

Daniels, Nathan J. *The Role of Information Technology Education within the Current Secondary Level Information Communication Technology Education Program in Wisconsin*

Abstract

This mixed methods descriptive study looks to answer the following research questions in regard to secondary education: 1) aside from general business and marketing skills, what Information Communication Technology (ICT) knowledge and skills should secondary-level ICT Education contribute to a Business Management and Administration program of study, 2) how should a student develop their ICT knowledge and skills within the context of their academic and career development coursework, and 3) how should students experience ICT in their preparation to competently work in Business Management and Administration? The study found that business and education respondents differed in their support and application of information communications technology (ICT). While they differ in software and hardware preference in their respective settings, there is agreement of fundamental expectations on student proficiency across word processing, visual presentation, and spreadsheet applications. Education respondents, especially in regard to ICT competencies for students taking Business and information technology focused courses employ the Microsoft Office Suite in the preparation of students for business career pathways.

Acknowledgments

I want to say thank you to all that participated in my research project. Those that took the survey and completed an interview your time and contribution went a very long way. Thank you to my Thesis Committee members, Dr. Kathy Brock, Dr. Amy Gullixson, and Dr. Urs Haltinner. Your time and expertise in working with me on the final steps of my graduate program was instrumental. Thank you to my Thesis Advisor, Dr. Urs Haltinner, your guidance during my undergraduate program, graduate program, and specifically during the writing of my thesis has been second to none. I would not be where I am today professionally without your mentorship. Thank you to my colleagues that helped persist in the completion of my paper. Your help and expertise were greatly appreciated. Finally, thank you to my family and friends, your individual and collective support and encouragement during this process was critical to keep me pushing through to completion.

Table of Contents

Abstract	2
List of Tables	8
List of Figures	9
Chapter I: Introduction.....	10
Statement of the Problem.....	14
Purpose of the Study	14
Research Objectives/Questions.....	15
Significance of the Study	15
Assumptions of the Study	16
Limitations of the Study.....	17
Definition of Terms.....	17
Chapter II: Literature Review	19
Business and Information Technology (B&IT)	19
Conceptual Framework.....	20
Growth and Change of Technology	21
Advancing Technology in the Information Communication Technology Era	22
Advancing Technology in the Internet of Things Era	24
Issues of Technology in School	28
Benefits of Technology in School.....	29
Technology Comprehension Growth During University.....	30
Consequences of Technology Media on Information Communication	31
Technology in the Workplace.....	32

Conclusion	32
Chapter III: Methodology	34
Research Questions.....	34
Research Approach	35
Subject Selection.....	35
Phase 1 Data Collection	37
Phase 2 Capta Collection	37
Instrumentation	38
Phase 1 Instrumentation.....	38
Phase 2 Instrumentation.....	38
Procedures	39
Data Analysis	41
Phase 1 Data Analysis.....	41
Phase 2 Data Analysis.....	42
Chapter IV: Results.....	43
Findings.....	43
Phase 1 Quantitative Findings	44
Phase 1: Demographic Findings	44
Survey Question 1	45
Survey Question 2	46
Survey Question 3	47
Survey Question 4	47
Survey Question 5.....	48

Survey Question 6.....	48
Survey Question 7.....	49
Survey Question 8.....	49
Survey Question 9.....	50
Survey Question 10.....	51
Survey Question 11.....	53
Survey Question 12.....	53
Survey Question 13.....	54
Survey Question 14.....	54
Phase 2 Qualitative Findings	55
Phase 2: Demographic Findings	55
The Interviewees	55
Research Question 2	56
Research Question 3	57
Chapter V: Discussion, Conclusion and Recommendation	60
Discussion: Phase 1.....	61
Phase 1 Discussion.....	61
Conclusions: Phase 1	63
Discussion: Phase 2.....	63
Phase 2 Discussion.....	64
Conclusions: Phase 2	65
Recommendations.....	66
Business Educators	66

Administration with CTE Coordinator	67
Future Research	67
References.....	68
Appendix A: About, Through, and For Business Tool.....	75
Appendix B: Welcome Email/Letter	76
Appendix C: Consent Form	77
Appendix D: Sampling of Survey Questions – Workforce Sector	79
Appendix E: Survey Questions – Education Sector	84
Appendix F: Qualtrics Survey Link Email/Letter.....	89
Appendix G: Qualtrics Survey Reminder Email	90
Appendix H: Qualtrics Survey Thank You Email/Letter	91
Appendix I: Pre-Interview Email/Letter	92
Appendix J: Interview Questions.....	93
Appendix K: Illustrated Theme Reduction Table Sample.....	94

List of Tables

Table 1: Information Technology Hardware Supported (Survey Question 1)	46
Table 2: Company/School Issued Devices (Survey Question 2).....	46
Table 3: Working From Home Expectations (Survey Question 3).....	47
Table 4: Working From Home on Issued Devices (Survey Question 4)	47
Table 5: Employee Device Selection Preference (Survey Question 5)	48
Table 6: Employee Device Selection Preference Options (Survey Question 6).....	48
Table 7: Operation System Requirement (Survey Question 7)	49
Table 8: Cellular Smartphones and/or Mobile Tablet Computer Type (Survey Question 8).....	50
Table 9: Most Used Applications (Survey Question 9).....	50
Table 10: Software Application Applicability (Survey Question 10)	52
Table 11: Self Software Installation on Issued Devices (Survey Question 11).....	53
Table 12: Internet-Based or Locally Installed Software Application Preference (Survey Question 12)	53
Table 13: Beginning Employee Software Training Needed (Survey Question 13).....	54
Table 14: Beginning Employee Hardware Training Needed (Survey Question 14)	55

List of Figures

Figure 1: Data Collection by Sectors	37
Figure 2: Geographic Limitations.....	37
Figure 3: Data Collection Process.....	40
Figure 4: Thematic Reduction Process	41
Figure 5: Research Question 2 Development of ICT Knowledge and Skills	56
Figure 6: Research Question 3 Experiencing ICT	58

Chapter I: Introduction

The world of information communications technology (ICT) has grown immensely. Businesses used to have to mail, fax, or hand deliver any correspondences between each other. Technology developed and overhauled the way people and business work together. The information highway or more commonly called the *internet* has established new avenues for people to *pen a letter* electronically and spell check it to help prevent errors. Meeting face to face used to mean having to physically travel to meet the other person. We no longer are restricted by geographical and financial constraints. Technology has provided ways for groups of people to digitally meet and view each other on a display (Tong, Yang, & Teo, 2013). A person is able to communicate in many different ways with another person or team on the other side of the world or just down the hall. These technologies are relatively simple tools but for some can still be somewhat of a challenge to understand. These tools are helping to close the space between what used to be a hindrance and increasing productivity.

Technology has benefitted workplace communication in many ways, and more advances occur every day. Companies continually attempt to implement technology into their work procedures. Initially there was not a large population of people pushing for the use of the internet. The Information Technology (IT) professional was the real promoter of this new technology (Potomac, 1998). Using technological tools has provided opportunities for companies to grow in size and efficiency. Today, businesses look for employees who have base technology literacy when they begin a new position, making the training process that much more efficient.

Information Communication Technology (ICT) involves a wide variety of skills, including database, desktop publishing, coding, audio, and video (Kaminski, Switzer, &

Gloeckner, 2009). This field is constantly growing and changing. Jobs that used to be there are no longer available and jobs that were unheard of are now mainstream. Being a mobile application developer was not a job up until the early twenty-first century. Now each week there is roughly 15,000 applications for phones and tablets published (Freierman, 2011). Those applications need people to write them and the demand for more applications is ever increasing.

Most employers believe that the IT employees understand all aspects of the Microsoft Office Suite. On the contrary, these organizations are finding that the IT professionals do not have a general grasp of productivity tools (Gorman, 2011). IT Professionals have a wide variety of position titles. Some serve in a network administrator capacity being in charge of the organization's technology infrastructure, as a tech support team member, or as a technology trainer, just to name a few. Those staff members will need the training to gain the necessary content to be effective in their positions.

A company's specific technological needs do not fall into the technology literacy gap between businesses needs and the employees' knowledge. These tools are company specific, and training of the employees is the responsibility of the company. There are many ways of tracking revenue, but each company implements specific technology that works for them (Levine, 2000). Employees can be expected to have a base knowledge of certain technology, but it must be accompanied by a certain amount of specific training by the employer.

The power of a computer application is immense. Procedures that at one time took days or weeks to complete finish in hours or minutes. Companies are seeing fewer mistakes from human error due to applications that do the calculations themselves, i.e., spreadsheets (Cezar & Sion, 2013). The abilities of software with spreadsheets that calculate numbers, word processors for writing documents, and presentation software to guide demonstrations, are helping

companies with their day-to-day operations. Some companies are having issues with employees not being trained on necessary software when entering a position. It is very important to employers to have employees that already have the needed skills. This allows the employer to save money in training and resources.

The world of software applications has grown exponentially over the years with more companies trying to increase their market share. Companies like Google are hoping to get more people to transition to their platform of apps and products, providing a free option for many organizations like small businesses and schools (Barr & Ovide, 2014). The tradeoff is that students and potential employees are unable to focus their skills on a general set of programs. Instead, they then know little about all programs and more about a select few.

High school programs have been in place to help better prepare students for the work force. Around 90-96% of high school graduates in the United States have completed at least one Career and Technical Education course (Plank, DeLuca, & Estacion, 2008). These students are taking classes that range from food production, animal care, automotive, engineering, carpentry, accounting, and computers. Skills learned from taking a Career and Technical Education course can become invaluable to a business. Better prepared workers result in less training time and money for a business. Schools strive to prepare student for the workplace, even though the constantly changing business environment makes that training more complex.

Throughout the country educational organizations have developed standards for educators to use to properly prepare students for the next steps in their life. Many states will either adopt the national standards that pertain to the content area, adjust the national standards to better reflect their needs and wants, or develop and implement their own. One of the national standards programs is *21st Century Skills*, which has been around since the 1980s. This program

has continually developed and updated its standards to stay relevant. 21st Century Skills do not only reference the core areas of reading, writing, math, science, social studies and world languages but also on life and career skills, learning and innovation skills, and information, media and technology skills (Learning, 2015).

Standards like the 21st Century Skills help schools to keep student learning on track compared to other schools in the state or nation. Wisconsin has developed their own learning standards for many content areas. In 2013, Wisconsin released their own standards for the Business and Information Technology content area (Instruction, 2013). These standards are then used by schools to develop curriculum for students in PreK-fifth, sixth-eighth, and ninth-twelfth grades. When schools in Wisconsin use the standards properly, it helps to establish an expected level of understanding by the students as they transition through school and eventually enter the workforce.

While the standards that have been put into place locally or nationally are very important, they can sometimes be too all-encompassing. When looking at a specific geographic area the needs of local businesses can be very different from those that the standards stress. There has to be input from businesses on what skills have to be covered in the local classrooms. The standards can then support those needs. There is a continually evolving list of skills that employers are looking for in prospective employees. Some of the newer skills being looked for involve email, web searching, and troubleshooting (King, Miller, & Bayerl, 2017).

Research has been done throughout the years to help better understand areas of inadequate knowledge. That research can then be turned into means of executing improvements and/or better understanding. When researching topics specific to a person's profession it helps to build upon the content area as a whole. This information can then be applied and improved for

the betterment of the researcher or those that are affected by it. Many Career and Technical Education programs look to ensure that the courses offered are known to students and to the greater local community (Kosloski & Ritz, 2016). Researchers in the CTE field found that this is an evolving practice.

The ever-evolving world of ICT will never stop. Researchers will need to continue looking into the areas of interest for them. Educators will need to stay up to date with content knowledge. Keeping up to date with changing trends has the opportunity to continue the growth of the content and with that bring a better understanding to those that use it. It has been found in different areas of CTE research has grown in both popularity and quality (Way, 2001).

Statement of the Problem

What used to be a need for employees to be able to quickly and accurately type on a typewriter/keyboard has transitioned to a need for employees to be able to work comfortably with technology. It is essential to have employees who understand the technology that a company may use (Gupta & Yadav, 2017). Otherwise, it is the responsibility of the organization to familiarize the employees with things they should already know. The company must provide the knowledge to ensure that employees end up with the specific skills the company is looking for (Dule, Liang, & Marler, 2006). Employers are looking for employees to come with a set of skills already learned. While secondary schools seek to provide students with the necessary content for the workforce, employers are finding areas of technology literacy that need improvements.

Purpose of the Study

The aim of this study is to inform educators with career pathway programs in information communications technology (ICT) where there is possible lack of knowledge of their students as

it pertains to technology literacy skills (i.e., MS Office Skills, Email Skills, etc.). This will help instructors to build curriculum and identify what tools are needed to properly educate students.

The results of the survey and interviews will look to the curriculum being taught to students.

The goal is to provide a better understanding for secondary school educators on guiding information communications hardware and software acquisition and application to better prepare students transitioning into post-secondary education programs, part time and full-time employment.

Research Objectives/Questions

The following questions will guide the research and use the *about, through, and for* framework:

- RQ:1 – Phase 1, (Quantitative Research Approach)
 - Aside from general business and marketing skills, what ICT knowledge and skills should secondary-level ICT Education contribute to a Business Management and Administration program of study?
- RQ: 2 – Phase 2, (Qualitative Research Approach)
 - How should a student develop their ICT knowledge and skills within the context of their academic and career development coursework?
- RQ: 3 – Phase 2, (Qualitative Research Approach)
 - How should students experience ICT in their preparation to competently work in Business Management and Administration?

Significance of the Study

Employers look to hire the most qualified applicants to meet their organizational needs. Through the interview process, they are in search of various qualities and hope to find applicants

who will meet their needs. When an employee does not have the necessary attributes, it places a burden on the company. This research intends to advance student skills in information technology skills consistent with preparing students to successfully meet the needs of their advanced programs of study and ensuing business and industry part and fulltime employment. Additionally, the National Career and Technical Education Research Agenda strives to align research with skills that prospective employees will need (Lambeth, Elliot, & Joerger, 2008). Bringing together The National Career and Technical Education Research Agenda and this topic will show if there is a need for schools to align their curriculum more cohesively with the employers' needs for their future workforce.

ICT educators, sometimes also known as Business and Information Technology (B&IT) and Career and Technical Education (CTE), work daily with students. Moving them through a programs of study that advances them into post-secondary education and training for the breadth of entering professional business administration, management, and marketing careers. A current dilemma encompasses support and access to information communications technology that is in alignment with the aforementioned career level occupations. This research will help business teachers request, implement and drive hardware, software, and pedagogy decisions that is more in line with their needs.

Assumptions of the Study

The researcher assumes the following:

- High school information communication technology students need to have specific information communication technology competencies in an effort to engage in a program of study leading them into business management and administration.

- This is a comparison of the technology literacy gap between businesses and its employees.
- Businesses have expectations that high school students have information communication technology skills.
- There is great value in possessing information communication technology skills for both the employee and employer.
- Preferred software for high school learners by Information Communication Technology Educators is the Microsoft Office suite of productivity programs.

Limitations of the Study

This research project is limited by the following:

- The scope of this study in the framework of Two-Year Technical Colleges, Two-Year Community Colleges, and Four-Year Universities might not reflect a holistic view business and industry and post high school education.
- Research is interpreted through the lens of business professionals, and business instructors focused in the areas of information communication technology.
- The limited scope of the sample size and business and post-high school institutions surveyed and interviewed.
- The nature of this descriptive mixed-methods study will not make generalizability claims.

Definition of Terms

During this study, a selection of terms will be used. These terms are clarified below:

Computer application/software. A program that performs tasks on a computer in a way that helps the user with the task at hand.

Google apps suite. A collection of online-based programs that are offered for free to users. The suite includes Docs, Sheets, Slides, and more.

Information communication technology (ICT). An umbrella term used to cover many different types of resources and tools that are used in the digital world.

Microsoft Office suite. A collection of programs made for business/office productivity. The suite includes Word, Excel, PowerPoint, and Access.

Technology. In the framework of this study technology refers to the tools that are used in conjunction to the needs of information communication technology. Examples of that would be computers, laptops, network devices, software, hardware, cellular phones, and tablets. This is just a small selection of items that are considered technology within this study. There are many more that would fall under this heading.

Chapter II: Literature Review

All around us technology is shaping our world. Computers, smartphones, TVs and many other devices play an integral role that some people have a difficult time without it. Students in college need these devices to be successful. Many teachers will not accept physical hard copy papers, and those documents need to be submitted via electronic means. It has been found that these tools are a substantial part of student's lives (Martínez-Alemán, 2014). Technology isn't just part of the student learning experience. Devices have found a place in the business world providing more efficient ways of communication, productivity, and create commerce (Lin, Chen, & Shao, 2015). The Information Communication Technology educator is responsible to a wide variety of classes. Within the state that this study took place ICT skills are a distributed responsibility across classroom teachers and Business teachers. The business educator is the central focus that this research aims to inform

Business and Information Technology (B&IT)

In Wisconsin, Business Education is part of the career and technical education (CTE) subject area program within the PK-12 setting. Business education (BE) goes by different names across the U.S. Within Wisconsin the BE program is referred to as Business & Information Technology (B&IT). Marketing Management and Entrepreneurship (MM&E) and B&IT dual licenser teachers are the emerging norm. The contemporary B&IT with MM&E teacher requires the teacher to embrace a broad range of competencies and a curiosity to continually advance based on business and industry trends. The ICT and B&IT Educator is generally the perceived expert to prepare youth for business competencies spanning information communications technology. However, ICT competencies are also infused across academic and career focused coursework consistent with conceptual framework that will be presented in this literature review.

Wisconsin B&IT program has evolved its emphasis in ICT in response to business and industry needs and keeping youth interested, engaged, and academic and career ready consistent with the advancing technologies employed within the local, regional, national and global business world. Therefore, the B&IT teacher constantly needs to remain attuned and evolve student learning opportunities consistent with emerging advancements of ICT and their application within business.

Conceptual Framework

Business education uses state and national standards to build their curriculum. The context of this study will employ the concept of *about business*, *through business*, and *for business*, (Alfeld et al., 2007). This construct illuminates how this study frames the pedagogic decisions on curricula design, instructional strategies, and learning supports employed to prepare students for the business world.

About business relates to providing all students with general business knowledge. This content is not necessarily taught in just a business class; it can be covered in any content area. An example might be teaching students about free enterprise in an economics class. Another example would be in a culinary class where students run actual restaurants or provide catering opportunities. These students could keep track of profit and loss based on supplies purchased and cost of the items sold.

Through business applies learning into the actual work environment. This can be done by placing students in a work-based learning environment where they learn skills that come directly from a business in the area of interest (Stern, Stone III, Hopkins, McMillion, & Crain, 1994). A student who has interest in computer networking can be placed into a network administration job and will have the opportunity to learn hands-on with knowledgeable

individuals from the field. Some schools are going ahead with creating their own school-based enterprises. These businesses can be as simple as a school store to as complex as running a bank either in the school or a location in town. Whether these learning opportunities come from in the school or directly from the business, they help to prepare students with hands-on learning. Of these students, some will return to their local communities for work (Andreason, 2013).

Lastly, *for business* looks to develop students that are in a career pathway that will lead them to complete a program of study in that business department. These students are interested in potentially owning their own businesses and are looking for a well-rounded business-based education. These business-based classes provide the student with a large foundation of knowledge in business. Students would more than likely take all business courses in the program of study. Potential classes would be accounting, business law, marketing, entrepreneurship, management, and more.

Growth and Change of Technology

One must be careful with the use of the word technology as it can mean a wide variety of things. One could consider Henry Ford's assembly line is technology. Others could say the tube at a local bank that sends paperwork between the customer and the teller in the drive-thru is technology. The way a motor keeps the pistons in sync is technology. The word itself can be categorized in many ways.

In the world of technology, new areas appear every day. The concept of a Wi-Fi-connected thermostat that people can access anywhere in the world and control it has only been around for the past few years. The ability to reach out to family members on the other side of the world and visually communicate with them is still relatively new. This does not only apply to consumers it also applies to businesses. Businesses and industries are continually adding new

systems to better the work experience and to stay relevant. These new technology trends are requiring employees to stay up to date with the new technology that is being implemented (Immonen & Sintonen, 2015). For some, it means having to learn new hardware and software.

The tools people take for granted are pivotal to daily life. No longer do people need to go to the local library for information. What used to be available in libraries and archives is now accessible through the devices people carry around daily (Martell, 2008). Information is readily available when a person has an unanswered question, as they no longer need to do the work of finding it. All that needs to be done is a series of searches that will result in the required information (Jordan, 2012). This is a potential benefit and hindrance all at the same time; it is all about how you look at it. In many cases, we no longer learn information. Instead we now just continually access information via an internet search. Learning has been replaced with obtaining.

Advancing Technology in the Information Communication Technology Era

The growth of technology has not slowed down nor will it for the foreseeable future. Computers have been such a large part of daily life that it is hard to think of life's day to day activities without one. Research has found in the last few years an increase in smart devices and a slow decline in computer sales (Shalvey, 2012).

Tablets, for example, substitute for stacks of notebooks, files, and folders. Being able to access any piece of information or document and allowing the user to annotate directly on it provides a higher degree of organization and communication. Mobile devices are finding a home in the hands of everyone. People are choosing devices based on their versatility and mobility (Kortum & Sorber, 2015). What used to be a tool for people on the go is now being used by both youth and adults. The cost of a smartphone and plan is not what it was back when

they were first becoming popular about the year 2000. Prices have come down to a point where even the most budget-minded person can afford them. Schools are starting to see cell phones and smart devices in the hands of younger and younger students with three-quarters of all students having some device (Madden, Lenhart, Duggan, Cortesi, & Gasser, 2013). Students are using them in school, and adults are using them in the workplace. In the workplace, tools like these are replacing massive, complex, and expensive equipment (Hill, 2014).

Smartwatches have been part of a growing trend the past few years. It is predicted that by the year 2018 there will be more than 214 million smartwatches (Rawassizadeh, Price, & Petre, 2015). The market for smartwatches is still a growing one. For the most part, they connect you to your phone and provide the same information as your phone, but more and more features are starting to be developed for them. Post-computer equipment, such as tablets and smart watches, is continuing to displace the conventional computer but at the same time pushing the boundaries of what is technology. Smartwatches would not be what they are today without the initial growth of smartphones and tablets.

Desktop computers can be seen from the desk at work to the house of a stay-at-home parent. While one may think desktop computers are being replaced by laptops, this is not totally true (Thompson, 2012). The desktop computer tends to be used for many different functions, from being used as a standard family computer to a more advance medical imaging. Desktops often favor being used in place of a laptop when performance is key. In the sense of medical imaging, a powerful machine is key. Additionally, the researcher needs a device for the intensive process of crunching complex data and the teacher may need to render complex graphics. These more advanced desktops will have better internal hardware, like a more

advanced Graphic Processing Unit (GPU), than a standard desktop someone might pick up at the local big box store (Zhu & Godavarty, 2016).

Laptops used to cost as much as a desktop computer but as the technology got better and competition between companies grew, the prices have become more feasible for consumers (Kessler, 2003). Being able to take work anywhere has changed the way work is done. Companies that once spent money on desktops are increasingly allocating money towards laptops. Where appropriate, these laptops allow that person to be mobile and get work done where ever it works for them (Go to work without leaving the house, 2004). A laptop cannot completely replace the desktop computer environment. There is still a case and purpose for both devices. Laptop are great for being on the go but a desktop computer tends to be more powerful and can do more complex tasks faster.

Increasingly companies search for ways to improve productivity, which includes providing employees with multiple workstations. On these workstations, it is possible to have multiple monitors connected to a computer or two or more desktops/laptops (Market, 2011). Having the multiple monitors or devices helps employees with work. No longer are there days of only doing one thing at a time. Now you are constantly having to be working on multiple aspects of your daily work responsibilities.

Advancing Technology in the Internet of Things Era

The world has been introduced to devices and tools that are increasingly interconnected with one-another. It used to be a personal computer was connected to the internet and that was about it. Additionally, companies are developing new products and services dependent on interconnected networks of information and services (Saarikko, Westergren, & Blomquist, 2017). The idea of a smart refrigerator might seem crazy to some, but to others it is a tool that

allows them to digitally see what is in their fridge. No longer does a person need to think *do we have milk at home?* while at the grocery store. They can connect to the appliance from wherever and look into the refrigerator. This is just one of the many new tools that are coming to market that are connected to the internet or other devices, commonly known as a smart device, in your house. Some of these devices are still expensive, but more and more startup companies are helping bring the prices down.

People who see an issue that needs fixing or a gap in the market are creating companies overnight. The internet helps these companies get their name out in to the world for consumers to make purchases and keep up with their ongoing demands (Basu, 2014). These companies are creating new products, apps, websites, and services that people use daily. What used to be a random idea of one person can now be produced and sold within a short timeframe.

Crowdfunding websites like Go Fund Me, Kickstarter, and Indiegogo are pioneering market opportunities for entrepreneurial visionaries and designers of anything (The Kickstarter Revolution, 2014). New or already developed companies can publish their products' story and ask consumers to finance the project even before a product is produced.

The smartphone is a prime example of technology that evolved into a completely different form of technology. The smartphone grew from the simple cellphone and merging it with the concept of a personal digital assistant (PDA) (Eger & Ehlhardt, 2018). Those that had a PDA and a cellphone were forced to carry both devices. Smartphone technology allowed for one device to carry both forms of technology. One such example is the smartphone. The iPhone pioneered by Apple, Inc. and introduced in 2007 (Fitchard, 2007). This device combined the cellphone and a personal assistant in one device. From this one device, a magnitude of jobs and companies have formed. Examples are app's, protective cases, screen protectors, or local

product repair services. The iPhone and other smartphones have carved out a place in the daily lives of people all around the world. The smartphone is the one device that is connecting our lives to an increasing array of smart devices hitting the market. While tablet computers had been around already for a while, it was not until the smartphone went mainstream that consumers started to look into purchasing these pricy devices.

Tablets tend to fall into the smartphone category, but one can make a point that they are in a category of their own. The tablet has found ways of building upon the success of the smartphone and making their own success. Tablets have become versatile, especially in business. Point of sale machines (cash registers) used to be a costly item for a startup. With a tablet and suitable app, the vendor is able to process purchases and payments right from the tablet. Newspapers, magazines, and catalogs have seen a market of consumers that are on tablets (Fundukain, 2012). Being able to create interactive multimedia has allowed publications to help the viewer engage more with the content. Tablet-type devices have continually grown and are starting to see a use as an alternative to a laptop for people on the go but do not need all of the functionality of a laptop.

The light bulb, invented by Sir Joseph Wilson Swan, goes back as far as the nineteenth century (Spear, 2013). While they have seen improvements in their technology in transitioning to florescent and LEDs, a new smart aspect has been added to them. These lights do not just turn on and off. They are able to produce different colors, different brightness, and can be programmed to change based on the audio in music or a video (Koyfman, 2016). All that is needed to control these lights is an app that can be installed on a smart phone. The smart bulbs are creating environments that are more engaging for those using them in conjunction with their TVs or businesses looking to add to the aesthetics of a display.

Televisions have seen a technological growth over the years. Many would consider the evolution of display quality and resolution important, which it is. Beyond visual and sound quality, TVs have also evolved into the *smart world*. No longer is a person tied down to an antenna, cable, or satellite for their content. Smart TVs allow the viewer to pull content directly from the internet. The content can be the exact same program someone would access through more traditional means but with the extra benefits of not having the deal with contracts, and receivers. The TVs have an operating system build directly into them, or have a device that plugs into the TV, that communicates with the internet and lets the user view programming from Netflix, YouTube, and national broadcasting services (Cugnini, 2013).

New forms of technology that are starting to receive a lot of media attention are virtual reality and augmented reality. By using a pair of glasses/head mounted display, a tablet, or phone, a consumer is able to either change the current environment or add overlays on top of what is in front of you (Mihelj, Novak, & Beguš, 2014). Video games, and touring locations around the world and space regularly utilize virtual reality technology. Augmented reality, while it is being used for games, is also finding a home in the world of manufacturing. The device can display a procedure and highlight components that require fixing (MacPhedran, 2018). The possibilities that come from being able to enter a one hundred percent immersive world or having information overlaid on top of a piece of a larger whole project are endless.

Home health devices typically include a scale, thermometer, continuous positive airway pressure therapy (CPAP) or a blood pressure cuff. People can now purchase devices like a smart watch, Bluetooth connected scale or thermometer, or more. All of these devices connect to the internet or directly to a phone to communicate vitals to the user or medical professional. The apps that complement these devices can monitor vital signs and even provide diagnostics and

procedural advice. Smart watches provide the capability to avoid life-threatening situation. A New York man's Apple Watch notified him that he had an abnormally high heart rate. The watch went a step further and told him to get medical help. At the hospital, doctors discovered an ulcer that had erupted (Dormehl, 2018). On an everyday basis, smart watches can monitor heart and breathing rates, count steps, and even be connected to insulin pumps.

These new categories of devices are areas that jobs are being created on a constant basis. Current high school students are being introduced to these and potentially make decisions to pursue a career in them. Having teachers that are versed in the new trends to help bring to light these new trends will help students. More and more devices are becoming *smart* and young people have major opportunities for professional growth.

Issues of Technology in School

While technology has found many benefits in the world, using technology appropriately in the classroom (and even in the office) often times presents a problem. Recreational (or habitual) use of cell phones, computers, and tablets can distract students and hinder learning (Wood et al., 2012). This distraction in the classroom (and office) is commonly called *Cyber-Slacking* (Taneja, Fiore, & Fischer, 2015, p. 141). There are many different types of cyber-slacking. Examples of this is a student on a phone texting, a student on a computer accessing non-class related websites, and a student playing a game on the computer just to name a few. Students that text are not paying attention to the content being covered in the classroom. They are engaged in the outside world and this can also distract other students. Students feel like they are able to multitask and will have multiple tabs open on their web browser. It is very easy to look like they are engaged in the class just by switching tabs when the teacher comes near. Games in class can also make a larger issue for the class. Most games are flashy and can cause

distractions for many students. Some of the games can also be violent and show acts of aggression. Phones and computers can be used beneficially by students, but they can also distract students and interfere with learning.

Ever-changing technology comes with the challenge for the teachers to continually remain current in how to use it (Archer et al., 2014). Teachers not only have to understand how a certain device works, but they must also anticipate when students may struggle with the technology and provide troubleshooting techniques so students can utilize the new technology independently. Understanding and applying updated software presents the most common challenge because it occurs so frequently.

Many school districts are currently implementing one-to-one initiatives, providing a device, like a laptop or tablet, in the hand of every student. These initiatives come with positive and negative effects. School districts must weigh all the factors involved in one-to-one initiatives before committing to such a substantial investment. Unfortunately, the research in this area is still fairly limited (Richardson et al., 2013). Some school districts are taking a wait-and-see approach, evaluating how other school districts handle the positive and negative factors. Some districts have learned through other districts' hard lessons to provide laptops and/or tablets within the classroom rather than issuing them to each student at the beginning of the year.

Benefits of Technology in School

There are many different types of devices available for implementation in the classroom. In the past few years, the use of interactive whiteboards has taken off (Northcote, Mildenhall, Marshall, & Swan, 2010). Interactive whiteboards include elements that are meant to engage students. The elements can be used to allow the teacher or student to write directly on an image or presentation. The interactive whiteboards can also be used to move items that you want

students to match to another item on the board. Other interactive tools are allowing mobile devices to be used for student voting. When implemented correctly, teachers ask students to enter in a vote with a voting app as a way to break the learning monotony (Cutrim, 2008).

Document cameras have introduced was of helping the teacher engage students. If a teacher wanted to bring the attention to a specific passage in a textbook, they might previously have to walk around the room to point it out. With a document camera the specific passage can just be pointed to and the camera in tandem with the classroom projector will show it to the students.

Video games are a growing part of youth and young adults' lives. More and more are turning to the games as a way to relax and find pleasure. Schools are starting to implement courses that capitalize on the area of video games. Some students tend to view classes as uninteresting, but by basing the curriculum around that of gaming, students find hard and complicated tasks enjoyable (Thomas, Ge, & Greene, 2011). Students are now coding games in high school and making them available for people to download. These are projects where students are getting real life results. The use of video games not just in game design classes saw an increase. Core classes went about implementing game consoles in the curriculum as well and found that student interest once again increased (Miller & Robertson, 2011). Students in elementary and middle schools are using video games to learn math and science content. Schools have gone to even incorporating games like Minecraft to engage students in curriculum (Tromba, 2013).

Technology Comprehension Growth During University

The Internet and Computing Core Certification (IC³) is a test administered by Certiport. This exam can lead to certification, stating the holder has a specific level of understanding of computers and the internet (Haber, 2003). By passing the three IC³ exams, a person receives an

industry accepted certification. This certification listed on a resume shows a prospective employer that the applicant already possesses desirable technology skills.

In the late 2000's research was done at the University of Wisconsin – Stout comparing freshmen and senior education majors' understanding of technology and the internet. Findings found that the freshmen students in the study performed at a more considerable disadvantage than the seniors. More seniors than freshmen from the study potentially earned their IC³ Certification (Sveum, 2010).

In many cases, a college freshman is three to four months out of high school. The research performed can also be applied to the students out of high school that do not have the skills needed to complete necessary technology and internet skills. The previous study looked at freshman in college and they can be compared to those that just left high school. These skills tend to be ones that an employer needs from an applicant. Not all skills from the IC³ Certification may align to the requirements of an employer, but a case can be made that most do.

Consequences of Technology Media on Information Communication

Technology has found ways of reshaping the world. An area of concern with businesses is that of communication and workplace etiquette. The office is an area of professionalism and responsibility. Technology does have a place in the office as it helps a company grow, but in a meeting, for example, it can be more of a distraction (Washington, Okoro, & Cardon, 2014). Supervisors dedicate meeting time for specific goals and objectives. Many supervisors find that the mobile device causes more issues to the flow of the meetings. It is much easier to get sidetracked from the primary objective when a device is available. Beyond the distractions, using modern technology also affects the quality of communication (Rosen, Chang, Erwin, Carrier, & Cheever, 2010). People who have been raised with a mobile device and instant

messaging have come to adopt a communication shorthand. Instead of typing out full words, they are shortened. Shortening of words can be done multiple ways: removing vowels, double letters, and/or creating an acronym. An example would be *BRB* for the phrase *Be Right Back*. These shortened words and phrases are finding their way in communications that have always meant to be professional. Using the shorten lingo can be interpreted as disrespectful and unprofessional to an employer or a client. Not everyone also knows exactly what the shortened words mean and can lead to miscommunications.

Technology in the Workplace

Tools are no longer a hammer and nail or a piece of paper and a pen. Time has found ways of taking an old tool and replacing it with a piece of hardware. This can take many different forms. Smart devices like a phone or tablet are becoming a more common sight in all different types of businesses. Hospitals, for example, no longer need to keep physical patient records. Instead they are housed digitally and can be accessed by many different types of devices (Moon & Chang, 2014). Going digital can have upfront investment implications but in the long haul, it can save companies money. Hospitals are seeing an increase in financial performance due to their transition to digital (Coile JR., 2003).

Conclusion

Technology is not what it was a week ago, a year ago, ten plus years ago. It is a constantly changing thing; the newest device can be out of date a day later. Resources and learning materials need constant updating to provide the users with appropriate information. Devices that have become second nature to many people are creating many positives and negatives in life, school, and the work place. Many say the positive aspects outweigh the negatives. No longer does a person taking an order at a table have to write down the order. A

tablet can be used to enter in the order, and have it directly sent to the kitchen. Smart appliances like washers and dryers notify the user when they laundry is ready. Many benefits are finding ways to better our world.

The world changed greatly with the invention of the semiconductor. Many of these changes could never have been predicted. Young people are communicating with friends and family on the other side of the world. A process that used to take weeks to send a letter only takes seconds for an electronic message to be sent. Technology has helped us see into the vast darkness of space all the while bringing us closer as humans.

Business are looking for the most skilled workers to join their teams. Technology has found ways of making aspect of the job easier and harder for the workers. Employees who have been with the company already might need to learn a new way of doing their job. A person who is looking for a job might need to brush up and develop their skills to even be considered for a position. Hiring managers or bosses are hoping to find the perfect applicant who already knows how to use the tools that they are using to make a smooth and easy transition.

Chapter III: Methodology

The aim of this study is to inform educators with career pathway programs in information communications technology (ICT) where there are possible gaps in the curriculum as it pertains to technology literacy skills (i.e., MS Office Skills, Email Skills, etc.). This will help to build curriculum and direct what tools are needed to properly educate students. A comparison of what is needed versus what the employees or students know will be the end goal of the study. The goal is to provide a better understanding for secondary school educators on guiding information communications hardware and software acquisition and application to better prepare students transitioning into post-secondary education programs, part time and full-time employment.

Research Questions

The following questions guide this mixed methods research study:

- Phase 1, (Quantitative Research Approach)
 - RQ:1 – Aside from general business and marketing skills, what ICT knowledge and skills should secondary-level ICT Education contribute to a Business Management and Administration program of study?
- Phase 2, (Qualitative Research Approach)
 - RQ: 2 – How should a student develop their ICT knowledge and skills within the context of their academic and career development coursework?
 - RQ: 3 – How should students experience ICT in their preparation to competently work in Business Management and Administration?

The methodology used in this research study of *The Role of Information Technology Education within the Current Secondary Level Information Communication Technology*

Education Program in Wisconsin is communicated under the following headings: research approach, sample selection, instrumentation, procedures followed, and data analysis.

Research Approach

This mixed method descriptive study incorporates both quantitative and qualitative-based research. The study employs a two-phase approach; surveys and interviews. Subjects were invited into an online survey (Phase 1). A quantitative study is very fact driven via numeric data that can be quantified. Within this descriptive study the quantitative RQ1 data is a prerequisite to answering the qualitative RQ2 and RQ3 of this mixed methods study (Creswell, 2008).

Within phase 2, the qualitative research approach, through interview, deepens insight into understanding the *why* and *how* beyond selective choice and closed ended questions in an effort to answer the qualitative research questions, RQ2 and RQ3. A qualitative approach has the means to delve deeper into the meaning of data, common to a mixed methods study (Creswell, 2008). Through this mixed methods research approach this study creates the bridge to meet the purpose of the study.

The survey is intended to collect general quantitative data about the person, their employment, their ICT skill set, and their level of interest in participating in the interview. After collecting and evaluating the survey information, interviewees will be chosen for the next phase. The survey and interview questions go through a validation process to ensure the questions related to RQ1, RQ2, and RQ3. The questions were also reviewed by the Research Advisor and Business and English Teacher colleagues at the researcher's high school.

Subject Selection

Accessing business pathway voices to achieve the studies purpose was critical to achieve the aim of the study. Therefore, the study focused on employers and their employees, specific to

ICT knowledge and skills expectations within the context of positions they seek employees in business functions and administrative functions. Additionally, post-secondary education teachers in business, management, administration, and marketing that advance student career opportunities in business and business support occupations were used in the collection of data for this study. Business subjects provided insight into business and industry ICT perceived needs while post-secondary education subjects informed the conceptual and technical hardware and software preferences in the preparation of students for professional careers in business.

Business subjects were invited based on the regional business community profile resulting in the selection if the subject was part of a profession in advertising, automotive, insurance, and manufacturing. Similarly, higher education institution subjects were invited into the study based on their curricular role across the business and associated pathways. The education subject had to be part of a business program of study. Excluded from the subject pool were PK-12 business educators in an effort to minimize bias given their role of teaching and leading PK-12 ICT.

A comparison across the subject grouping created the opportunity to better understand ICT hardware and software acquisition and the desired pedagogic decisions on how PK-12 business and associated pathways students experience it within the conceptual framework of *about, through, and for* business (see Figure 1).

Data was collected from the below areas with one to two representatives from each, see figure 1.

Workforce Sector	Education Sector
Banking	Two-Year Technical Colleges – Trade programs
Health Care	Two-Year Community Colleges – Up through associate degrees
Manufacturing	Four-Year University – Bachelor’s degrees and above

Figure 1. Data collection by sectors.

Location was limited to the state of Wisconsin – broken up into the areas below in Figure 2. Initially contact was made in five geographic areas but a response only came from three areas.

Geographic	Within Each Geographic Area
Northcentral Wisconsin	Urban
Southeast Wisconsin	Rural
Southwest Wisconsin	

Figure 2. Geographic limitations.

Phase 1 data collection. This phase focused on collecting quantitative data through the web-based survey process. At the completion of it the research transitioned into Phase 2. Once surveys were returned and reviewed, a pool of subjects were contacted to achieve the personal interviews in Phase 2.

Phase 2 capta collection. This phase involved interviews concentrating on questions pertaining to research questions 2 and 3. The interviewees contributed their insight that resulted in themes that contribute to answering research question 2 and 3. Pseudonyms were employed in an effort to share a basic demographic profile of interviewees. Non-gender specific pseudonym names were employed to ensure protection of interviewee identity. The pseudonyms include Cameron, Devin, Kelly, Morgan, and Skyler.

Instrumentation

Previously stated the study used a mixed methods approach, involving qualitative and quantitative data collection. Quantitative data will be collected from a survey and qualitative data will be obtained via an interview.

Phase 1 instrumentation. The study implemented two tools to collect information. The first was a cross-sectional survey that is sent to candidates and asked questions related to Phase 1 content. The survey was only used once per person. This provided a picture of what is expected at the company or institution for their ICT-related needs. From the results people were selected to participate in Phase 2 if they said they would like to.

Phase 2 instrumentation. The primary tool used was a semi-structured interview. The interview guide was prepared with open ended questions. Anticipated answers were explored in an effort to develop follow-up prompts in an effort to dig deeper into responses (examples are asking to further explain, tell me more about..., redirecting a yes or no response, and moving deeper into a component of an answer that needed more explanation). Additionally, field notes were employed by the interviewer to capture response time or hesitation, tone of the response, etc. The interviewee was asked for consent to be recorded. Recordings were transcribed employing voice transcription to text from www.rev.com. These transcriptions were used in reducing the conversation into enduring themes.

The content of the discussion and survey questions reverted back to the about, through, and for business framework. This structure was continually used to drive forward the research and ensure the content stays pertinent. In addition, the interview and survey questions tied into the Wisconsin Business and Information Technology Standards as well as 21st Century Skills. Tying in the Wisconsin Business and Information Technology Standards provides a direct

connection to the State of Wisconsin's objectives for young adults in the education system. The Wisconsin Business and Information Technology Standards were updated in 2013 (Wisconsin Department of Public Instruction, 2013). This connection between the survey and interview questions illustrate what educators should be teaching in Wisconsin schools.

Procedures

The research encompassed a two-phase approach for the data collection. First was a Qualtrics survey and the second was an interview. Qualtrics is an online survey management site that the University of Wisconsin-Stout provides to students. Businesses and secondary education institutions were contacted via email and/or phone calls, asking for their participation and providing them with the basic details of the study. Research subjects were identified through web-searching based on ICT related work performed (Workforce) or educational ICT courses being taught (Post-secondary and University) stratified by geographic location. A letter was developed to be sent by email (see Appendix B). Prospective subjects were contacted via email or phone call asking for their participation. The consent form was provided over email (see Appendix C).

Upon confirming participation in the research, respondents received the survey electronically or via traditional mail. Those that were part of the workforce received one version of the survey (see Appendix D). Education sector subjects received a survey tailored to them (see Appendix E). Those wanting surveys administered electronically received a Qualtrics Survey link in their email (see Appendix F). Hardcopies of the surveys were mailed to those that requested them along with a self-addressed and stamped return envelope. Subjects were given two weeks to complete the survey. After one week a reminder email or letter was sent non-responder (see Appendix G). Once the survey was completed a thank you email or letter was

sent (see Appendix H). All questions used in the survey related to ICT tools. Respondents were asked questions related to type of software, hardware, and operating systems being used. Further questions related to operating systems and the respondent's willingness to switch to another operating system. Asking questions about the types of computers and devices used and for what purpose further contributed to the data. A final question asked if the respondent was interested in participating in a follow-up interview designed to delve deeper into the topics being covered by the survey.

Once the results from the respondent surveys were processed, those indicating their willingness to be interviewed were contacted to setup a time for the interview (see Appendix I). Interviews were secured at a time convenient to the respondent. They were notified that all interviews would be recorded to increase the integrity of their contribution. Additionally, the respondent was asked for their consent to being recorded. The semi structured interview guide questions were developed to build upon the information and results from the surveys (see Appendix J). The collected data was analyzed employing the following reduction process (see Figure 3). The procedure consisted of contacting potential participants and completing a consent form, respondents taking the survey, interviewing those who offered to participate, and analyzing the data.

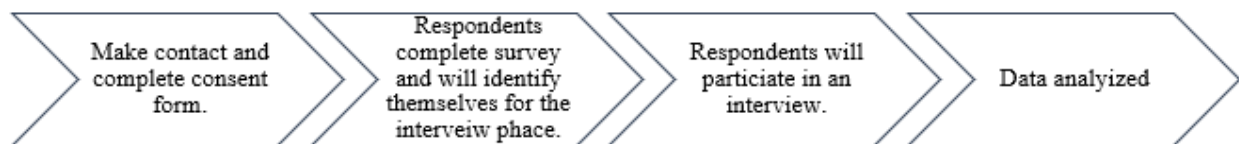


Figure 3. Data collection process.

The research required responses from both employers and post-secondary education, the questions needed to ask the same thing but be worded differently. Questions for the employer referred to employees, while the questions for the education sector referred to students. In the

Qualtrics survey, the second question after providing consent asks the respondent to select the field to which they most closely related to, business or education. From there, the survey branched into the work force or education sector questions.

Data Analysis

Survey results were tabulated using Qualtrics analysis tools. Results from the survey helped to build upon the literature review to better describe the context of the research. The research employed choice and selected response survey open-ended questions. At the conclusion of the survey all respondents were given an opportunity take part in an interview designed to capture their voice through a grand tour question technique. The survey responses resulted in quantitative descriptive data reported in data tables and the interviews responses were analyzed through a thematic reduction process resulting in enduring themes. Chapter 4 highlights both data and enduring themes as findings.

Phase 1 data analysis. The survey data was tabulated in Qualtrics. The results were covered in to a simple number table that showed the number of respondents that choose that

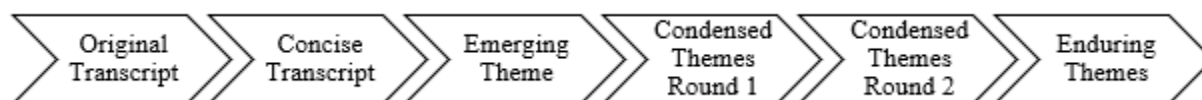


Figure 4. Thematic reduction process.

specific response. This data was relatively simple to analyze due to the closed- ended question nature of it. The data from the Qualtrics tabulations were then brought over into tables identifying questions and responses. Data in the table was reported in a way that is clear and concise for the reader. Some information was consolidated for ease of interpretation and layout of the table. The consolidation did not tamper with the reporting or message of the data.

Phase 2 data analysis. With Phase 2 interviews the data collected, was more complex, and needed to be made clearer. Interviews were conducted with participants that said they would be interested in continuing the conversation. The interviews were transcribed using www.rev.com. The transcripts then used a reduction table to take the data from its whole down to its parts and finally to its enduring themes (see Appendix K). Since the data was converted into a transcript, it was revised and formed into usable elements. A reduction table allows for this to happen in a data centric way while keeping the core message intact (Haltiner, 2018). The process of taking a transcript down to specific enduring themes is a multistep process. Figure 4 shows the theme reduction process that was used in the research.

Chapter IV: Results

The Role of Information Technology Education within the Current Secondary Level Information Communication Technology Education Program in Wisconsin looks to inform educators that are a part of a career pathway program in information communication technology (ICT) of the areas of course content that might be lacking. This information can then be used to help develop current curriculum to better align with the technology skills post-secondary education and employers seek employee competency in. Through the data collected via the survey and interviews a more comprehensive program of study can be developed. This mixed methods approach employing both a survey and interviews had the potential to capture deeper and richer meaning respondent meaning consistent with the study's overarching research questions. The survey (quantitative) and interview (qualitative) questions are presented as descriptive data and themes.

The qualitative Phase 1 provided facts related to the area of technology skills a student and employee needs. The interviews from Phase 2 reflect how students should develop and experience their information technology skills

Findings

The following findings represent both quantitative and qualitative responses. The quantitative findings are aligned with the study's Research Question 1; *Aside from general business and marketing skills, what ICT knowledge and skills should secondary-level ICT Education contribute to a Business Management and Administration program of study? (RQ1)* The qualitative findings are aligned with the study's Research Question 2 and 3; *How should a student develop their ICT knowledge and skills within the context of their academic and career*

development coursework? (RQ2), and How should students experience ICT in their preparation to competently work in Business Management and Administration? (RQ3)

Phase 1 Quantitative Findings

In the Phase 1 of this study, respondents answered survey questions to reveal what technology knowledge and skills are necessary in Business Management and Administration program of study. These questions tied into the *About Business* concept from the *about, through, and for business* principles. The results were used to develop areas of importance. Most survey questions connected directly to one of the three research questions. Due to the broad reference of the content some questions were asked that help paint an overall picture.

Phase 1: Demographic findings. The data collected in Phase 1 is quantitative data from a survey. This information is used to build a picture of the technology skill needed. The respondents used in Phase 1 were selected randomly by their geographic representation in Wisconsin. The research considered whether the company was too large and more than likely would not respond and if contact information was available on their website. While gender was not specifically a point used in the selection of candidates, responses represented almost a fifty-fifty split in female and males. The survey was sent to fifteen females and eighteen males.

The businesses that responded covered a wide landscape of sizes and industry sectors. The respondents from health care employed over 8,000 people alone. The health care represented different workforces like human resources management, business finance, insurance, marketing management, and healthcare professionals. The respondents from the banking industry work at a local bank employing about 70 people. The jobs of those working at the locations align with sectors like business information management, operation management, accounting, marketing communication, and marketing research.

Respondents from educational institutions that completed the survey, similar to businesses, came from a wide variety of schools. These schools ranged from more rural schools and having 750 students to that of four-year universities and having upwards for 25,000 enrolled. The program of studies the schools cover general management, operation management, business finance, accounting, insurance, supply chain management, banking services, and marketing management.

Thirty-three survey requests were sent out and thirteen started or completed the survey. Of the thirteen, four did not finish the survey and nine fully completed it. The four who did not complete spent less the thirty seconds in the survey. This resulted in a drop in the total number of respondents and those that actually completed the survey. Those who did complete the survey represent the following occupations: banking, health care, two-year community colleges, and four-year universities.

Survey question 1. Table 1 shows the results from survey question 1 (SQ1). All respondents said that operating desktop computers should be required in business classrooms. Industry appears to take more of an all-encompassing approach to computing devices that it accepts and perhaps may expect of its employers as opposed to education. While desktop computers has 100% selection rate not far behind was laptop computers with 88%.

Table 1

Information Technology Hardware Supported (Survey Question 1)

Hardware	Workforce (N=5)	Education (N=4)	Total (N=9)	Percentage
Desktop Computers	5	4	9	100.0%
Laptop Computers	5	3	8	88.8%
Mobile Tablet Computers	4	1	5	55.5%
Cellular Smartphones	5	1	6	66.6%

Survey question 2. Devices being issued to employees on behalf of the businesses or schools have increased over the years. Most devices being provided for employees and students are desktop or laptops as seen in Table 2. Roughly 83.3% of respondents stated the desktop and laptop computers are provided for work use to employees. In the classroom, only one school said they issue laptops to students. This shows the importance the workforce puts on making sure employees have the right tools that they need. The low numbers in the education sector only show that they are not issuing devices. Students are just expected to purchase what is necessary for class.

Table 2

Company/School Issued Devices (Survey Question 2)

Devices	Workforce (N=5)	Education (N=1)	Total (N=6)	Percentage
Desktop Computers	5	0	5	83.3%
Laptop Computers	4	1	5	83.3%
Mobile Tablet Computers	3	0	3	50.0%
Cellular Smartphones	0	0	0	0.0%

Survey question 3. The expectations for an employee or a student to work from home is almost split fifty-fifty as shown in Table 3. The workforce specifically sees a close split down the middle at 55.5%. Though in education all but one respondent said students are expected to work from home. While it may depend on your job if you will work from home. Students are most than expected to put in time outside the classroom.

Table 3

Working From Home Expectations (Survey Question 3)

Response	Workforce (N=5)	Education (N=4)	Total (N=9)	Percentage
Yes	2	3	5	55.5%
No	3	1	4	44.4%

Survey question 4. This question was a follow up to SQ3 that was only shown to those who said, *yes* to their employees or students working from home. Table 4 shows that 100% of respondents do not require their workers or students to use issued or approved devices. Personal devices that employees and students already have at home can be used. Two connecting words, *that are*, were initially missing from this question and were add later on to ensure proper grammar.

Table 4

Working From Home on Issued Devices (Survey Question 4)

Response	Workforce (N=2)	Education (N=3)	Total (N=5)	Percentage
Yes	0	0	0	0.0%
No	2	3	5	100.0%

Survey question 5. 66.6% of users are allowed to choose what devices they can use at work according to Table 5. The workforce is slightly stricter on this, but education is completely open. This shows that future employees need to be versed in multiple types of hardware.

Table 5

Employee Device Selection Preference (Survey Question 5)

Response	Workforce (N=5)	Education (N=6)	Total (N=9)	Percentage
Yes	2	4	6	66.6%
No	3	0	3	33.3%

Survey question 6. This question was a follow up to SQ5 that was only shown to those who said, yes to their employees or students choosing the type of devices to be used with 83.3% and 66.6% respectfully. Table 6 shows desktop and laptop computers are the devices most often used. In education, any device that can complete the assignments is welcomed to be used. The workforce also allows some smartphones to be used, which allow for the use of apps but the mobility of a connected device.

Table 6

Employee Device Selection Preference Options (Survey Question 6)

Devices	Workforce (N=2)	Education (N=4)	Total (N=6)	Percentage
Desktop Computers	1	4	5	83.3%
Laptop Computers	1	3	4	66.6%
Mobile Tablet Computers	0	3	3	50.0%
Other	1	3	4	66.6%

Survey question 7. This question was a follow up to SQ5 that was only shown to those who said, *no* to their employees or students choosing the type of devices to be used. The workforce relies heavily on devices using the Windows operating system for their computers. 100% of respondents said that Windows is used on their devices. One also incorporates Google-based operating systems. The education sector did not respond to this question. Table 7 lists operating system required to be used base on respondent's response.

Table 7

Operation System Requirement (Survey Question 7)

Operating System	Workforce (N=3)	Education (N=0)	Total (N=3)	Percentage
Apple	0	0	0	0.0%
Google	1	0	1	33.3%
Linux	0	0	0	0.0%
Windows	3	0	3	100.0%
Other	0	0	0	0.0%

Survey question 8. Table 8 illustrates that 100% of respondents said that cellular smartphones and/or mobile tablet computers can use either the Apple or Google operating system. It is important for future employees to have knowledge in both systems.

Table 8

Cellular Smartphones and/or Mobile Tablet Computer Type (Survey Question 8)

Devices	Workforce (N=5)	Education (N=3)	Total (N=8)	Percentage
Apple iOS	5	3	8	100.0%
Google Android	5	3	8	100.0%
Other	0	0	0	0.0%

Survey question 9. Table 9 illustrates across business and education respondents that the core business applications across word processing, the internet browser, and email all ranking as most and often employed at 8 to 1 being least used. A point of interest is the that only 1 business subject reported presentation software as most or often used while educators were split with 3 of the 4 respondents indicating most or often used. Of further interest is that no educator respondents indicating database software as most or often employed as opposed to the 3 to 2 split with business and industry respondents

Table 9

Most Used Applications (Survey Question 9)

Applications	Workforce (N=5)		Education (N=4)		Total (N=9)	
	Most/Often*	Least	Most/Often*	Least	Most/Often*	Least
Word Processor	4	1	4	0	8	1
Spreadsheet Software	3	2	2	2	5	4
Presentation Software	1	4	3	1	4	6
Database Software	3	2	0	4	3	6
Internet Browser	4	1	4	0	8	1
Email	5	0	3	1	8	1

*Most and often are being reports as one category

Survey question 10. The Microsoft Office Suite of apps was chosen more often than the other options. 6 out of 9 respondents indicated requiring the use of Microsoft Word compared to the 0 of the 9 respondents for Google Docs. Microsoft Excel, PowerPoint, and their email client were again chosen over the Google counterpart application. Respondents have no discernable preference for specific Web browsers. Microsoft's email clients and online storage were chosen above Google's equivalent clients. Some applications that are proprietary to the workforce or education sectors were proprietary software or cloud-based solutions. Examples of this would be a medical records software at a hospital or a gradebook application for schools. Results in Table 10 have been consolidated for *prefer* and *acceptable and* have been abbreviated to *P/A*.

Table 10

Software Application Applicability (Survey Question 10)

Applications	Workforce (N=5)			Education (N=4)			Total (N=9)
	Required	P/A*	N/A	Required	P/A*	N/A	
Word Processors							
Google Docs	0	4	1	0	2	2	9
Microsoft Word	5	0	0	1	2	1	9
Spreadsheet Softwares							
Google Sheets	0	2	3	0	2	2	9
Microsoft Excel	5	0	0	2	1	1	9
Presentation Softwares							
Google Slides	0	2	3	0	2	2	9
Microsoft PowerPoint	3	2	0	1	2	1	9
Database Softwares							
Microsoft Access	1	2	2	0	1	2	8
MySQL	0	2	3	0	1	2	8
Internet Browsers							
Chrome	0	5	0	1	3	0	9
Internet Explorer/Edge	2	3	0	0	3	0	8
Email Clients							
Google’s Client	0	1	4	0	2	1	8
Microsoft’s Client	5	0	0	2	1	1	9
Online Storage							
Google Drive	0	3	2	0	2	1	8
Microsoft Sharepoint	2	2	1	0	2	1	8

*P/A is a convergence of *preferred* and *acceptable*.

Survey question 11. This question was a follow up to SQ2 that was answered by respondents indicating *yes* in response to either their workplace or institution issuing devices to their users. All respondents (100%) answered *no* to users being able to install software that they personally choose on devices issued to them (see Table 11).

Table 11

Self Software Installation on Issued Devices (Survey Question 11)

Response	Workforce (N=5)	Education (N=1)	Total (N=6)	Percentage
Yes	0	0	0	0.0%
No	5	1	6	100.0%

Survey question 12. Table 12 displays that 66.6% of respondents indicated that internet-based software was preferred. Internet-based programs can provide many benefits. Being able to access the program from anywhere on any device provides more flexibility for the company and staff. If an employee or student can access a program from anywhere, they can do work while traveling to different locations and from the comfort of their home. If the person cannot physically make it to work, they could still work from home and not fall behind.

Table 12

Internet-Based or Locally Installed Software Application Preference (Survey Question 12)

Installation Options	Workforce (N=5)	Education (N=4)	Total (N=9)	Percentage
Software Installed Locally	1	2	3	33.3%
Internet-Based Solutions	4	2	6	66.6%

Survey question 13. Table 13 illustrates the need for some training in all areas. There was only one instance where training was not needed in an area, and that was in Word Processors. A Likert scale was used based on training needed to no training needed.

Table 13

Beginning Employee Software Training Needed (Survey Question 13)

Software	Workforce (N=4)			Education (N=3)			Total (N=7)
	None	Some	Need	None	Some	Need	
Word Processor	1	3	0	0	2	0	6
Spreadsheet Software	0	3	1	0	1	2	7
Presentation Software	0	4	0	0	3	0	7
Database Software	0	2	1	0	1	0	4
Internet Browsers	0	3	0	0	2	0	5
Email Clients	0	2	0	0	2	0	4
Online Storage	0	3	0	0	3	0	6

Survey question 14. Across the board respondents said that there is some training that has to happen with their students and staff in table 14. One respondent did say there was a need for training regarding mobile tablet computer. A Likert scale was used based on training needed to no training needed.

Table 14

Beginning Employee Hardware Training Needed (Survey Question 14)

Hardware	Workforce (N=4)			Education (N=2)			Total (N=6)
	None	Some	Need	None	Some	Need	
Desktop Computers	0	2	0	0	2	0	4
Laptop Computers	0	3	0	0	2	0	5
Mobile Tablet Computers	0	3	1	0	2	0	6
Cellular Smartphones	0	3	0	0	1	0	4

Phase 2 Qualitative Findings

The Phase 2 interviews' main objectives were to further clarify *through business*, and *for business*. The responses from the interviewees revealed three enduring themes specifically from each research question. These themes help to specify the main points from the interviews.

Figure 5 illustrates the enduring themes found from Research Question 2, and figure 6 states those from Research Question 3.

Phase 2: Demographic findings. From the interviews conducted in Phase 2, a collection of qualitative data is provided. One of the last questions on the survey allowed interviewees to choose whether or not they wanted to participate in the Phase 2 interview. From the nine people who completed the survey, five of them signified they would like to participate in the interview.

The interviewees. Cameron works in health care administration, responsible for recruitment, hiring, training, and basic human resource development activities. Devin works as the technology training and development specialist, which includes but is not limited to incident response and disaster recovery planning for both fellow employees and customers of a financial institution. Kelly is in upper-level management leading the development of digital user

interfaces/marketing elements of the member experience and research, development, implementation, and launch of new products and services within the banking sector. Morgan is the President and CEO of a financial institution working across multiple locations to move the bank forward; responsibilities are multifaceted and include supervising other employees and their projects. Lastly, Skyler is a post-secondary educator at a technical and community college and works with both high school and college students in providing instruction. High school students are enrolled in a dual-credit program, in which students have the opportunity to earn college credit while still in high school. Collectively the interviewees represent business administration, management, finance, and marketing functions across private and public business and industry and teaching and learning professions.

Research question 2. The second research question asks *how should a student develop their ICT knowledge and skills within the context of their academic and career development coursework?* From the interviews and RQ2, three themes were developed as shown in figure 5.

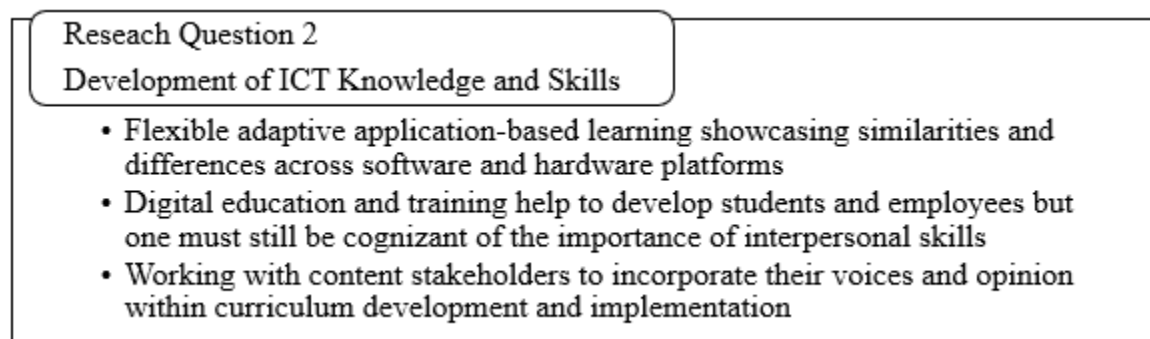


Figure 5. Research question 2 development of ICT knowledge and skills.

The first theme from RQ2 was continually addressed in all of the interview. Students need *flexible adaptive application-based learning* opportunities in the classroom. The technology is continually changing and educators need to not teach for what was as that will not benefit the students of the future. By bringing in new tools that are actually being used in the

workplace will better prepare students for future employment. These tools can be software, hardware, or the utilization of up-to-date lessons which align with workplace practices. Cameron, the respondent from the healthcare industry, said it very nicely, "...giving them the skill where they can adapt to any type of technology." Students are looking for ways to stay interested in classes. Teaching outdated curriculum is not a benefit to them. Staying current and sharing different ways of doing a task will help to keep them engaged and provide them with real life skills. Finding ways of using industry standard software and tools help to build the relevance of the curriculum.

The third theme that came from RQ2 is including content stakeholders to *contribute their viewpoints of the development and execution of curriculum*. Teacher may or may not do their best to stay current with best practices in their area. Employees who are actually working in it and can provide very specific context and examples on what need to be taught. Skyler, from the education sector, mentioned an instance where the school works with businesses and received back "...data and information that actually prompted several small minor changes... ..to our curriculum..." This ensures that the classroom content is current and relevant to the skill needed when entering the workforce.

Research question 3. The final research question states *how should students experience ICT in their preparation to competently work in Business Management and Administration?* The interviews and RQ3 provided three themes as shown in figure 6.

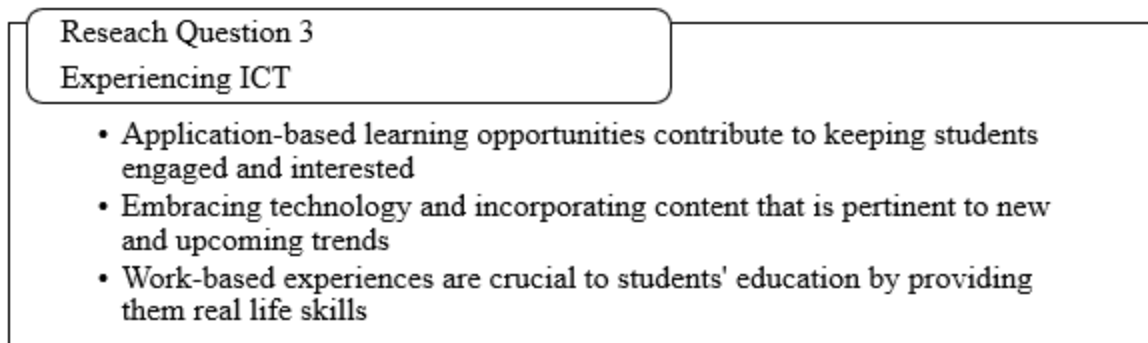


Figure 6. Research question 3 experiencing ICT.

The second theme of *embracing and incorporating technology that is relevant to new and upcoming trends* is quite important. It also can tie back to RQ2's third theme of working with those in the fields to develop curriculum. Morgan, from the banking industry, said "Trying to figure out constantly what's the next thing." Educators must work to provide the content of those new trends and tools that current students need. New software and hardware are constantly being introduced. If the hardware can make work easier, companies will implement it. If work places implement new software and hardware, it is incumbent of the teacher to expose students to the updated applications. Students need to be ready for whatever new technology is being used.

The final theme of including *work-based experiences are crucial to students' education by providing them real life skills* establishes educational practices for student's success. Teaching concepts in the classroom facilitates students' learning only so far. Students need to experience using technology in a simulated or actual workplace to fully appreciate the expectations companies will have. No longer is it words in a textbook or a teacher giving a presentation. Now it is real life on-the-job training in an area specific to the students' interests and career aspirations. At the school that Skyler teacher at "Every one of our students must demonstrate competency of our program outcomes through an internship experience." These

students are learning very valuable skills and engaging is critical experiences. A student in an internship might discover that they may have a misconception of a career field in which they are interested. In the end this can either confirm their future career or help them to make necessary changes to their plans.

Chapter V: Discussion, Conclusion and Recommendation

The Role of Information Technology Education (ICT) within current secondary level ICT education and training through Business and Information Technology (B&IT) programs in Wisconsin is to inform educators within career pathway programs about ICT inclusive of hardware and software applications employed and how they be encountered by students.

Insight across Phase 1 (quantitative) and Phase 2 (qualitative) aims to inform ICT Educators, including Business, Marketing, and Information Technology (B&IT) on hardware and software acquisition. Additionally, it has the power to guide curricula development and delivery decision making that ensures high school graduates are prepared to transition into their post-high school academic and career journey. The following questions guided the inquiry: *1) aside from general business and marketing skills, what ICT knowledge and skills should secondary-level ICT Education contribute to a Business Management and Administration program of study? (RQ1), 2) how should a student develop their ICT knowledge and skills within the context of their academic and career development coursework? (RQ2), and 3) how should students experience ICT in their preparation to competently work in Business Management and Administration (RQ3).*

Two limitations came to be during the progression of the study 1) sample size came to be. This was not the initial intent of the research but proved to be a positive end result. This drop in participation could be from lack in interest in the topic or concern over the time commitment. This did not hinder the overall impact of the study. The small amount of responses helped keep the scope of the study impactful and manageable. Another limitation was respondents not completing the survey or skipping questions completely. This could be attributed to respondents seeing the list of questions and feeling they do not have time to finish them. Another possible

reason is that the respondents did not understand the question or did not think they could speak to the questions.

The resultant findings will be presented in the order of Phase 1 and Phase 2 discussion, conclusion, and recommendations. A final summary will bring meaning across Phase 1 and 2.

Discussion: Phase 1

The following will unveil the meaning guided by the overarching research question: Aside from general business and marketing skills, what ICT knowledge and skills should secondary-level ICT Education contribute to a Business Management and Administration program of study (RQ1).

Phase 1 discussion. This phase took a quantitative approach in its aim to gain insight into Research Question 1 (RQ1). The question's directive was to identify what information communication technology (ICT) knowledge and skills are needed by secondary-level students. Relating RQ1 back to *about business* in the about, through, and for business framework builds on the validity of the topic. A survey developed in alignment with RQ1 findings shared by respondents across software, hardware, and operating systems that students should encounter at the secondary level.

Software that is being used with the contemporary high school has the potential to advance students into post-secondary business management and administration academic and career pathways. The findings support that Educators and Employers expect their students and employees to have experience and a level of proficiency with Microsoft Office suite of programs. Respondents, support that given the option to choose between Microsoft Office and Google Docs, Google Sheets, and Google Slides their declared preference being Microsoft Office and/or the Office 365 productivity suite. This is at odds with the current Google schools

and software practice. When a school needs technical support find that that support through Google can be more challenging than with Microsoft (Brodin, 2010). Students still need to have interactions with the Google productivity suite, but employers are looking for their future employees to be somewhat proficient in the Microsoft Office Suite.

Customized web-based applications are being tailored just for the convenience of it being located on the internet. Companies are looking for ways to increase productivity and ease of workflow. Taking outdated paper records and implementing an online system allows for ease of access from anywhere (Moon & Chang, 2014). The companies that are putting money into these web-based applications and implementing ones that are developed just for them. This refines the workflow. Often a company must pick a software option that works the best for them but will have to sacrifice options that they need but the software does not offer. A program created just for them can include all features and tools the business needs to be efficient.

Business, industry, and post-high school are expecting ICT users to be comfortable with both a desktop and a laptop (see Table 1). Mobile tablets and cellular smartphones see a lower acceptance. Having an environment where an employee is able to multitask and work across multiple devices and systems is pivotal (Market, 2011). Business and industry is increasingly supporting employees with their desire and need to be mobile. Many employees need to be able to take their device and get work done while traveling. Desktop computers are still relevant though. The power that can come from a desktop computer is more than that of most laptops or tablet devices.

This study found that the operating system to be just as important as the device itself. Industry prefers the Microsoft Windows operating system over other options. This has seen a widespread adoption in many education and workforce. Interestingly, there was no preference

from post-secondary education respondents. This may suggest that post-secondary educators within the focus of this study shift the responsibility of the decision up to the student. This may suggest a business and education stakeholder interaction opportunity about ICT tools and skills and the way students are prepared for their business and business support careers.

Conclusions: Phase 1

Those that teach in the area of information communication technology need to stay up to date with current software, hardware, and operating system trends is a difficult one. The tools that are needed to prepare the students for the many facets of potential employment are continually changing. Business focused education and its ICT instructors understand normed software employed within the business and business support workforce. Based on this study this encompasses the Microsoft Office suit including the MS Office 365 cloud-based productivity suite.

Hardware can be more challenging due to the cost associated with upgrading and purchasing new equipment. Not all schools are able to afford the newest tablet that the workforce is currently using. A teacher might have to find different ways to use limited hardware or ways that might not require the need of the actual item, for example a web quest looking at the features of the devices. Operating systems that are currently being implemented should be used just like software and hardware. The Microsoft Windows operating system was signified as one that needs to be used. Providing the best tools and resources for students is important and finding what works best for the students will guide the process.

Discussion: Phase 2

This phase applies a qualitative approach to Research Question 2 (RQ2) and Research Question 3 (RQ3) which resulted in six themes captured through the interviews. A survey was

used to develop themes from the interviewee's responses. The two research questions make connections to through and for business from the about, through, and for business principles.

Phase 2 discussion. The *about business* theme states, flexible adaptive application-based learning showcasing similarities and differences across software and hardware platforms, that allows content to be updated based on current trends. Comparing the similarities and differences of different software application and hardware platform ensures the student can make an educational choice based on the needs of the current project. Implementing a digital-heavy curriculum is important to future student success. The *through business* theme says, digital education and training help to develop students and employees but one must still be cognizant of the importance of interpersonal skills. Students still need to know how to have a conversation and how to structure proper electronic communications. Being flexible in software and hardware offerings and including interpersonal skills are very important. The *for business* theme, working with content stakeholders to incorporate their voices and opinion within curriculum development and implementation. Knowing what needs to be taught is just as important. Educators need to receive input on what should be required in their curriculum. Teaching standards must be accompanied by input from the business world regarding essential skills, along with necessary hardware and software. The local stakeholders from business and industry will help to direct the way curriculum is developed and taught. By helping to develop curriculum that reflects the stakeholder's needs, it can help in the long run if a former student returns to the local area for future employment.

Research question 3 focuses on how a student should experience information communication technology. Ways in which to provide this experience can include working in a small school store or working at an internship. Application-based learning opportunities

contribute to keeping students engaged and interested, is the first theme from RQ3. A teacher's expert opinion regarding appropriate curriculum and instruction must include what that teacher has learned from real-world businesses and institutions. This appropriate curriculum and instructions molded by real-world experience must also be coupled with authentic, hands-on lessons for the students. In alignment with previous research, being able to say this program is what is used in hospitals to keep patient records shows more validity than that of a simple copy (Moon & Chang, 2014).

Theme two states, embracing technology and incorporating content that is pertinent to new and upcoming trends. Teaching content that is old and out dated can lead to students losing interest. Showcasing the new trends that will affect students helps to highlight the importance. The teacher needs to be willing to learn the new ways and leave the outdated concepts behind. The final theme is; work-based experiences are crucial to students' education by providing them real life skills. Having a student get their hands dirty and learn the skills as an intern or actual employee can help the students put perspective on the job itself. Students are able to learn the skills while doing the job under the supervision of industry professionals. This can also be done within the walls of a school. Having the students run school-based enterprises gives a similar experience but in school. The Phase 2 research questions explain different ways for how students can develop and experience ICT in their education, helping them to become more prepared for future education and employment.

Conclusions: Phase 2

Working with stakeholders to develop and implement high school curriculum is very important. Based on the stakeholders' expectations of employee's skills educators know what skills to include to help develop more well-rounded students which can lead to future employees.

These business professionals can help keep the classroom software, hardware, and operating systems relevant. Teachers do the best job possible but sometimes staying current with technology skills and trends can be missed. The industry stakeholders can keep the tools relevant to what is being used in the workforce. The interviewees provided information that will develop the classroom. Skyler stated that workforce stakeholders “provided me some fantastic data and information that actually prompted several small minor changes.” The educators with community input need to employ tools that are mainstream to business and industry. Stakeholders are able to build upon the classroom learning not only by informing the educator on trends but by providing education work-based experiences. These relationships with employers can help students learn valuable skills directly within the work world (Stern, Stone, III, Hopkins, McMillion, & Crain, 1994).

Recommendations

The following are recommendations from shareholders to contribute to curriculum within Wisconsin. The research of this study uses the *about*, *through*, and *for business* framework to structure itself. Guiding educators on what needs to be taught, how to teach it, and for the desired program of study (Alfeld et al., 2007).

Business educators. Keeping content current and relevant needs to be an important directive of the business educator. Not only to keep the content engaging for students but to also ensure the software, hardware, and operating systems used are relevant. Educators need to work with those stakeholders that work in the appropriate career fields to help develop and approve the curriculum. These business contacts know what their teams work with on a daily basis and where the technology is going in the future. The business educator needs to find different work-based experience to place students into. These partnerships can be grown with the help of the

local stakeholders. Putting students into the real-life experiences and on the job training help to bring home the classroom content. Another, recommendation would be for the educator with the help of the department creates an advisory board. The advisory board would be built up of ICT educators, administration, and those stakeholders from the community. As a team the people will be able to help develop a comprehensive program of study that incorporates the about, through, and for business framework. A final recommendation would be to educate students on interpersonal skills. Ensuring students know how to properly communicate with potential clients, supervisors, and employers will help to build their professional reputation.

Administration with CTE coordinator. School administration needs to provide a supportive foundation for the educator looking to incorporate new ICT knowledge and skills. There can be a financial aspect that needs to be covered and providing appropriate funds will build the curriculum and benefit the students immensely. The educator might be looking to try new classroom programs or implement a school-based enterprise. These can be a great undertaking and supporting the program will once again have a benefit for the students.

Future research. The research on this topic needs to be replicated on a larger scale to build a stronger case. Reproducing the study will help to continually develop areas for educators to create and update curriculum. Business curriculum and specifically, information and communications technology need constant refinement as does this research project. Reaching a larger population across the education and workforce sector has the opportunity to meet the ever faster cycling software solutions employed in our personal and professional lives.

References

- Alfeld, C., Stone, III, J., Aragon, S., Hansen, D., Spindler, M., Romine, R., & Hui-Jeong, W. (2007). Looking inside the black box: The value added by career and technical student organizations to students' high school experience. *National Research Center for Career & Technical Education Research*, 245. doi:10.5328/CTER31.3.121
- Andreason, S. (2013, October 20). *It's all about the job*. Retrieved January 14, 2017, from <http://plannersweb.com/2013/10/jobs/>
- Archer, K., Savage, R., Sanghera-Sidhu, S., Wood, E., Gottardo, A., & Chen, V. (2014). Examining the effectiveness of technology use in classrooms: A tertiary meta-analysis. *Computers & Education*, 10. doi:10.1016/j.compedu.2014.06.001
- Barr, A., & Ovide, S. (2014, September 3). Boss talk: Google's strategy to unseat Microsoft Office. *Wall Street Journal*, 1.
- Basu, S. (2014). Internet startups post 25 per cent job growth; overall hiring up 15 per cent during July 2014. *The Economic Times*, 1. Retrieved from <https://economictimes.indiatimes.com/>
- Brodkin, J. (2010). Google apps vs. Microsoft Office. *Network World*, 14-16.
- Cezar, M., & Sion, B. (2013). Modeling and optimizing the business processes using Microsoft Office Excel. *Journal of Information Systems & Operations Management*, 8. Retrieved from <http://jisom.rau.ro/>
- Coile JR., R. C. (2003). Managing the digital hospital. *Physician Executive*, 48-51.
- Creswell, J. W. (2008). *Planning, conducting, and evaluation quantitative and qualitative research*. Columbus: Pearson Prentice Hall.
- Cugnini, A. (2013). Smart TV. *Broadcast Engineering*, 12-15.

- Cutrim, E. S. (2008). Using a voting system in conjunction with interactive whiteboard technology to enhance learning in the English language classroom. *Computers & Education*, 18. doi:10.1016/j.compedu.2006.07.001
- Dormehl, L. (2018, May 3). *Apple Watch is credited with saving New York man's life*. Retrieved from <https://www.cultofmac.com/545505/apple-watched-is-credited-with-saving-new-york-mans-life/>
- Dule, J. H., Liang, X., & Marler, J. H. (2006). Training and effective employee information technology use. *Journal of Management*, 32(5), 23. doi:10.1177/0149206306292388
- Eger, A., & Ehlhardt, H. (2018). *On the origin of oroducts: The evolution of product innovation and design*. Cambridge, United Kingdon: Cambridge University Press.
doi:10.1017/9781316941539
- Fitchard, K. (2007). Apple breaks the rules. *Telephony*, 8-9.
- Freierman, S. (2011, December 11). *One million mobile apps, and counting at a fast pace*. Retrieved from <https://nyti.ms/2R5DJDG>
- Fundukain, L. (2012). Tablet computers. In *Gale Encyclopedia of E-Commerce* (pp. 711-712). Farmington Hills: Gale, Cengage Learning.
- Go to work without leaving the house. (2004). *New Media Age*, 13.
- Gorman, M. F. (2011). A case study in effectively bridging the business skills gap for the information technology professional. *Journal of Education for Business*, 86(1), 8.
doi:10.1080/08832321003663348
- Gupta, S., & Yadav, A. (2017). The impact of electronic banking and information technology on the employees of banking sector. *Management and Labour Studies*, 380-387.

- Haber, J. (2003, April). Certification: Your return on training investments. *The Journal*, 30(9), 3.
doi:10.1177/2393957517736457
- Haltiner, U. (2018). *Making meaning from your data*. Menomonie, WI.
- Hill, K. (2014). Using mobile devices for motor-learning: Laboratory exercises. *Journal of Physical Education, Recreation & Dance*, 6. doi:10.1080/07303084.2014.946190
- Immonen, M., & Sintonen, S. (2015). Evolution of technology perceptions over time. *Information Technology & People*, 17. doi:10.1108/ITP-12-2013-0219
- Instruction, W. D. (2013). *Wisconsin standards for business and information technology*.
Madison: Wisconsin Department of Public Instruction.
- Jordan, J. M. (2012). *Information, technology, and innovation resources for growth in a connected world*. New York: John Wiley & Sons.
- Kaminski, K., Switzer, J., & Gloeckner, G. (2009, September). Workforce readiness: A study of university students' fluency with information technology. *Computers & Education*, 228-233. doi:10.1016/j.compedu.2009.01.017
- Kessler, M. (2003). Competition helps drop laptop prices. *USA Today*, 1.
- King, H., Miller, C., & Bayerl, J. (2017). Building technology competency: an evidence-based approach to improving student technology skills. *Journal of Formative Design in Learning*, 45-55. doi:10.1007/s41686-017-0001-5
- Kirkpatrick, K. (2015). Using technology to help people. *Communications of the ACM*, 3.
- Kortum, P., & Sorber, M. (2015). Measuring the usability of mobile applications for phones and tablets. *International Journal of Human - Computer Interaction*, 12.
doi:10.1145/2693432

- Kosloski, M. F., & Ritz, M. M. (2016). Research needs: career and technical education. *Career and Technical Education Research*, 117-140.
- Koyfman, S. (2016). Bulbs are getting even brainier in 2016. *Hardware + Building Supply Dealer*, 24.
- Lambeth, J. M., Elliot, J., & Joerger, R. (2008). The national career and technical education research agenda. *Techniques*, 83(7), 4.
- Learning, T. P. (2015, May). P21 framework definitions. Washington, DC.
- Levine, D. S. (2000). BASE bridges gap between business and technology. *San Francisco Business Times*, 15(11), 24.
- Lin, W. T., Chen, Y. H., & Shao, B. B. (2015). Assessing the business values of information technology and e-commerce independently and jointly. *European Journal of Operational Research*, 12. doi:10.1016/j.ejor.2015.03.048
- MacPhedran, S. (2018, April 6). *Augmented manufacturing: The big six Hololens use cases for manufacturers*. Retrieved from <https://blog.smith.co/2018/augmented-manufacturing>
- Madden, M., Lenhart, A., Duggan, M., Cortesi, S., & Gasser, U. (2013). *Teens and technology 2013*. Cambridge: Pew Research Center.
- Market, M. (2011). *Ergonomic assessment of employees operating multiple computers at a workstation within Company XYZ*. Menomonie: University of Wisconsin-Stout.
- Martell, C. (2008). The absent user: Physical use of academic library collections and services continues to decline 1995–2006. *The Journal of Academic Librarianship*, 7. doi:10.1016/j.acalib.2008.06.003
- Martínez-Alemán, A. M. (2014). Social media go to college. *Change: The Magazine of Higher Learning*, 8. doi:10.1080/00091383.2014.867203

- Mihelj, M., Novak, D., & Beguš, S. (2014). *Virtual Reality Technology and Applications*. Dordrecht: Springer. doi:10.1007/978-94-007-6910-6
- Miller, D. J., & Robertson, D. P. (2011). Educational benefits of using game consoles in a primary classroom: A randomised controlled trial. *British Journal of Educational Technology*, 850-864. doi:10.1111/j.1467-8535.2010.01114.x
- Moon, B., & Chang, H. (2014). Technology acceptance and adoption of innovative smartphone uses among hospital employees. *Healthcare Informatics Research*, 304-312. doi:10.4258/hir.2014.20.4.304
- Northcote, M., Mildenhall, P., Marshall, L., & Swan, P. (2010). Interactive whiteboards: Interactive or just whiteboards? *Australasian Journal of Educational Technology*, 7.
- Plank, S. B., DeLuca, S., & Estacion, A. (2008, October). High school dropout and the role of career and technical education: A survival analysis of surviving high school. *Sociology of Education*, 345-370. doi:10.1177/003804070808100402
- Potomac. (1998). Bridging the business-technology gap ec success demand IT and marketing team. *Electronic Commerce News*, 3(34), 1.
- Rawassizadeh, R., Price, B. A., & Petre, M. (2015). Wearables: Has the age of smartwatches finally arrived? *Communications of The ACM*, 2. doi:10.1145/2629633
- Richardson, J. W., Mcleod, S., Flora, K., Sauers, N. J., Kannan, S., & Sincar, M. (2013). Large-scale 1:1 computing initiatives: An open access database. *International Journal of Education and Development using Information and Communication Technology*, 4-18.
- Rosen, L. D., Chang, J., Erwin, L., Carrier, L., & Cheever, N. A. (2010). The relationship between “textisms” and formal and informal writing among young adults. *Communication Research*, 420-440. doi:10.1177/0093650210362465

- Saarikko, T., Westergren, U. H., & Blomquist, T. (2017). The Internet of things: Are you ready for what's coming? *Business Horizons*, 667-676. doi:10.1016/j.bushor.2017.05.010
- Shalvey, K. (2012). PC, Windows 8 sales seen soft vs. tablets for holiday. *Investor's Business Daily*, 1.
- Spear, B. (2013). Let there be light! Sir Joseph Swan and the incandescent light bulb. *World Patent Information*, 38-41. doi:10.1016/j.wpi.2012.10.001
- Stern, D., Stone III, J., Hopkins, C., McMillion, M., & Crain, R. (1994). *School-based enterprise: Productive learning in American high schools*. San Francisco: Jossey-Bass.
- Sveum, E. C. (2010). *A comparative study of the University of Wisconsin-Stout freshman and senior education major's computing and Internet technology skills/knowledge and associated learning experience*. Menomonie: University of Wisconsin - Stout.
- Taneja, A., Fiore, V., & Fischer, B. (2015). Cyber-slacking in the classroom: Potential for digital distraction in the new age. *Computers & Education*, 11. doi:10.1016/j.compedu.2014.11.009
- The Kickstarter Revolution. (2014). *Marketing*, 56.
- Thomas, M. K., Ge, X., & Greene, B. A. (2011). Fostering 21st century skill development by engaging students in authentic game design projects in a high school computer programming class. *Journal of Educational Computing Research*, 391-408. doi:10.2190/EC.44.4.b
- Thompson, S. (2012). Student use of library computers: Are desktop computers still relevant in today's libraries? *Information Technology and Libraries*, 20-33.

- Tong, Y., Yang, X., & Teo, H. (2013, May-June). Spontaneous virtual teams: Improving organizational performance through information and communication technology. *Business Horizons*, 361-375. doi:10.1016/j.bushor.2013.01.003
- Tromba, P. (2013). Build engagement and knowledge one block at a time with minecraft. *Learning & Leading with Technology*, 20-23.
- Washington, M. C., Okoro, E. A., & Cardon, P. W. (2014). Perceptions of civility for mobile phone use in formal and informal meetings. *Business and Professional Communication Quarterly*, 52-64. doi:10.1177/1080569913501862
- Way, W. L. (2001). Reflections on family and consumer sciences research at the end of the millennium: An introduction and editorial note. *Family and Consumer Sciences Research Journal*, 115-116. doi:10.1177/1077727X01302001
- Wisconsin Department of Public Instruction. (2013). *Wisconsin standards for business and information technology*. Career and Technical Education Team. Madison: Wisconsin Department of Public Instruction.
- Wood, E., Zivcakova, L., Gentile, P., Archer, K., De Pasquale, D., & Nosko, A. (2012). Examining the impact of off-task multi-tasking with technology on real-time classroom learning. *Computers & Education*, 9. doi:10.1016/j.compedu.2011.08.029
- Zhu, B., & Godavarty, A. (2016). Near-infrared fluorescence-enhanced optical tomography. *BioMed Research International*, 1-10. doi:10.1155/2016/5040814

Appendix A: About, Through, and For Business Tool

The data for this research project centers around the concept of About Business, Through Business, and For Business. These three guide all research. As a tool to help the conversation during our interview, I have provided a tool to explain the concepts.

About Business:

“About Business” informs teachers on what needs to be taught. What concepts need to be covered to make a student more versed in the field. These can be concepts on how business works, the tools used, free enterprise, economics and being a smart consumer to name a few.

Through Business:

“Through Business” takes the aspects from “About Business” and provides a way for them to be taught to students. Whether that is through mock trials in the classroom or a school-based enterprise or youth apprenticeships where students get a hand on working opportunities.

For Business:

“For Business” looks to develop students that are in a career pathway that will lead them to complete a program of study in that business department. These students are interested in potentially owning their own businesses and are looking for an overall rounded business-based education.

Appendix B: Welcome Email/Letter

Hello _____,

My name is Nathan Daniels and I am a graduate student at the University of Wisconsin-Stout. I'm in the process of completing my master's program and finishing my research paper. My education has always been very important to me and I knew then I wanted to pursue my master's once I got my footing as a high school educator. I retrieved your contact information from the _____. I'm hoping to have a _____ respond to my study. If I have the wrong person or someone that would be more appropriate to talk with could you, please let me know who I should contact.

Part of being an educator that is pivotal for me is ensuring that what I am teaching my students is relevant and current. This can be challenging for a business and information technology educator as the world is constantly changing and new technology is being developed daily. No longer are the days of punch cards and typewriters. Now, some of the newest technology centers around devices in our pockets and headsets that take us into a whole new world.

My thesis centers itself around finding out what technological skills employers are looking for in their employees and what they are actually receiving for candidates or employees. I want to then take the results from my research and provide them to schools. This information can help direct the classroom curriculum to better prepare students for the workforce. Students that one day might be applying for jobs in your company.

My research is broken up into two phases. Phase one is an online survey to collect responses related to the research, basic demographic information, and asking respondents if they would be interested in participating in phase two of the research. Phase two will take those that indicate a desire to contribute and asks them to have a further conversation related to the research. This interview will be audio recorded and done over the phone. All data that is collected via the survey and interview will be kept completely anonymous. There will be no identifiable information listed in any published work.

If this research project is something you are willing to participate in, please contact me. Once I receive confirmation of your interest I will send you the online survey for phase one. If you have any further questions or concerns, please reach out to me. I can be contacted via email at or via cell phone,, after 3pm.

Thank you for your time,

Nathan Daniels

Appendix C: Consent Form

UW-Stout Implied Consent Statement for Research Involving Human Subjects

Consent to Participate in UW-Stout Approved Research

Title:

The Role of Information Technology Education within the Current Secondary Level Information Communication Technology Education Program in Wisconsin

Investigator:

Nathan Daniels

Email:

Cell:

Research Sponsor:

Urs Haltinner

Email:

Office Phone:

Description:

The aim of this study is to inform PK-12 educators on career pathway programs in information communications technology (ICT) and understand gaps of knowledge and skills that might exist as it pertains to ICT literacy skills (I.E., MS Office Skills, Email Skills, etc.). Furthermore, this study has the potential to advance curricula and methods/strategies employed to educate students. A comparison of what is needed versus what the employees know will be the end goal of this study.

RQ:1 Phase 1, (Quantitative Research Approach)

Aside from general business and marketing skills, what information communication technology knowledge and skills should secondary-level Business Education contribute to a Business Management and Administration program of study?

RQ: 2 Phase 2, (Qualitative Research Approach)

How should a student develop their ICT knowledge and skills within the context of their academic and career development coursework?

RQ: 3 Phase 2, (Qualitative Research Approach)

How should students experience ICT in their preparation to competently work in Business Management and Administration?

Risks and Benefits:

The risks from this study are minimal but the benefits are great. Phase one of this study will consist of an online survey using Qualtrics (an online survey tool) allowing respondents to anonymously contribute their responses. Phase two will ask those that opt into phase 2, a phone interview to provide their personal voice on the topic of information and communication technology literacy. The results from this study has the potential to advance PK-12 curricula specific to ICT literacy and skills. Such curricula may advance the preparation of students for employment after high school and/or perusing their post-secondary education.

Special Populations:

Due to the nature of this study only business leaders, managers and support personnel and post PK-12 business and information communications technology educators will be invited to participate. Subjects will have specific knowledge on the topic of ICT. Participates will be chosen based on geographic rural, suburban and urban locations across the state of Wisconsin. This stratified selection process is being used to capture the range of voices in an effort to yield better richer data.

Time Commitment:

The time commitment for participating in the research project is minimal. Opting in to the study begins with an anonymous online that will take 15 to 20 minutes. You will be given the option to join phase 2 of the study, a phone interview which will take 30 to 45 minutes.

Confidentiality:

Confidentiality is important and taken very seriously. No personal information will be included in any published documentation. Phase one of the study is an online survey using Qualtrics, a web-based survey tool. All data will be reported as descriptive with no identifies to a name or specific region or employer. Phase two will be the phone interview that you have the opportunity to opt into at the end of the initial survey. You will be allowed to choose from a window of specified dates and times convenient to you for a personal interview. All responses will be recorded and transcribed to a text file. All identifies will be removed. Additionally, only the collective themes across all interviewees will be reported as findings. Any names will be removed, inclusive of organizational names and locations. Generic descriptions will be employed in an effort to present a demographic profile of the interviewees; which will only be employed as a descriptive context of the findings.

Right to Withdraw:

Your participation in this study is entirely voluntary. You may choose opt out of the research without any adverse consequences to you. You have the right to stop the survey at any time. However, should you choose to participate and later wish to withdraw from the study, there is no way to identify your anonymous document after it has been turned into the investigator. If you are participating in an anonymous online survey, once you submit your response, the data cannot be linked to you and cannot be withdrawn.

IRB Approval:

This study has been reviewed and approved by The University of Wisconsin-Stout's Institutional Review Board (IRB). The IRB has determined that this study meets the ethical obligations required by federal law and University policies. If you have questions or concerns regarding this study, please contact the Investigator or Advisor. If you have any questions, concerns, or reports regarding your rights as a research subject, please contact the IRB Administrator.

Investigator:

Nathan Daniels

Email:

Cell:

Advisor:

Urs Haltinner

Email:

Office Phone:

IRB Administrator

Elizabeth Buchanan

Office of Research and Sponsored Programs

152 Vocational Rehabilitation Bldg.

UW-Stout

Menomonie, WI 54751

... ..

... ..

Statement of Consent:

By completing the following survey and or interview you agree to participate in the project entitled, The Role of Information Technology Education within the Current Secondary Level Information Communication Technology Education Program in Wisconsin

Appendix D: Sampling of Survey Questions – Workforce Sector

Daniels Thesis

Start of Block: Informed Consent

This study has been reviewed and approved by The University of Wisconsin-Stout's Institutional Review Board (IRB). The IRB has determined your project, “The Role of Information Technology Education within the Current Secondary Level Information Communication Technology Education Program in Wisconsin” is **Exempt** from review by the Institutional Review Board for the Protection of Human Subjects. The project is exempt under **Category #2/3** of the Federal Exempt Guidelines.

The IRB has determined that this study meets the ethical obligations required by federal law and University policies. If you have questions or concerns regarding this study, please contact the Investigator or Advisor. If you have any questions, concerns, or reports regarding your rights as a research subject, please contact the IRB Administrator.

Investigator: Nathan Daniels

Email:

Cell:

Advisor: Urs Haltinner

Email:

Office Phone:

IRB Administrator: Elizabeth Buchanan

Office of Research and Sponsored Programs

152 Vocational Rehabilitation Bldg.

UW-Stout, Menomonie, WI 54751

Email:

Office Phone:

Statement of Consent: By completing the following survey and or interview you agree to participate in the project entitled, The Role of Information Technology Education within the Current Secondary Level Information Communication Technology Education Program in Wisconsin.

☐ I consent, begin the study

☐ I do not consent, I do not wish to participate

Please choose the sector that best relates to your respective profession.

- ☐ Banking
 - ☐ Health Care
 - ☐ Manufacturing
 - ☐ Two-Year Technical Colleges
 - ☐ Two-Year Community Colleges
 - ☐ Four-Year University
-

Please continue to the remaining two pages of the survey.

End of Block: Informed Consent

Start of Block: Workforce

Which devices are required for your employees to use within the range of their job description?
(select all that apply):

- ☐ Desktop Computers
 - ☐ Laptop Computers
 - ☐ Mobile Tablet Computers
 - ☐ Cellular Smartphones
-

Which of the following devices does your company issue to employees for work usage? (select all that apply):

☐

Desktop Computers

☐

Laptop Computers

☐

Mobile Tablet Computers

☐

Cellular Smartphones

Are employees expected to work from home?

☐ Yes

☐ No

Are employees that are working from home required to use issued/approved devices?

☐ Yes

☐ No

Are employees allowed to choose the type of devices that use?

☐ Yes

☐ No

Which type of devices do you allow employees to select from? (select all that apply)

☐

Desktop Computers

☐

Laptop Computers

☐

Mobile Tablet Computers

☐

Other - Please list them below.

Which computer operating system does your company require employees to use? (select all that apply)

☐

Apple

☐

Google

☐

Linux

☐

Windows

☐

Other - Please list them below.

Which type of Cellular Smartphones and/or Mobile Tablet Computers do you allow employees to utilize?

☐

Apple iOS

☐

Google Android

☐

Other - Please list them below.

Appendix E: Survey Questions – Education Sector

Daniels Thesis

Start of Block: Informed Consent

This study has been reviewed and approved by The University of Wisconsin-Stout's Institutional Review Board (IRB). The IRB has determined your project, “The Role of Information Technology Education within the Current Secondary Level Information Communication Technology Education Program in Wisconsin” is **Exempt** from review by the Institutional Review Board for the Protection of Human Subjects. The project is exempt under **Category #2/3** of the Federal Exempt Guidelines.

The IRB has determined that this study meets the ethical obligations required by federal law and University policies. If you have questions or concerns regarding this study, please contact the Investigator or Advisor. If you have any questions, concerns, or reports regarding your rights as a research subject, please contact the IRB Administrator.

Investigator: Nathan Daniels

Email:

Cell:

Advisor: Urs Haltinner

Email:

Office Phone:

IRB Administrator: Elizabeth Buchanan

Office of Research and Sponsored Programs

152 Vocational Rehabilitation Bldg.

UW-Stout, Menomonie, WI 54751

Email:

Office Phone:

Statement of Consent: By completing the following survey and or interview you agree to participate in the project entitled, The Role of Information Technology Education within the Current Secondary Level Information Communication Technology Education Program in Wisconsin.

☐ I consent, begin the study

☐ I do not consent, I do not wish to participate

Please choose the sector that best relates to your respective profession.

- ☐ Banking
 - ☐ Health Care
 - ☐ Manufacturing
 - ☐ Two-Year Technical Colleges
 - ☐ Two-Year Community Colleges
 - ☐ Four-Year University
-

Please continue to the remaining two pages of the survey.

End of Block: Informed Consent

Start of Block: Education

Which devices are required for your students to use within the range of their education program?
(select all that apply):

- ☐ Desktop Computers
 - ☐ Laptop Computers
 - ☐ Mobile Tablet Computers
 - ☐ Cellular Smartphones
-

Which of the following devices does your college/university issue to students for work usage? (select all that apply):

☐

Desktop Computers

☐

Laptop Computers

☐

Mobile Tablet Computers

☐

Cellular Smartphones

Are students expected to work from home?

☐

Yes

☐

No

Are students that are working from home required to use issued/approved devices?

☐

Yes

☐

No

Are students allowed to choose the type of devices that use?

☐

Yes

☐

No

Which computer operating system does your institution allow students to select from? (select all that apply)

☐

Desktop Computers

☐

Laptop Computers

☐

Mobile Tablet Computers

☐

Other - Please list them below.

Which type of devices does your institution allow students to select from? (select all that apply)

☐

Apple

☐

Google

☐

Linux

☐

Windows

☐

Other - Please list them below.

Which type of Cellular Smartphones and/or Mobile Tablet Computers do you allow students to utilize?

☐

Apple iOS

☐

Google Android

☐

Other - Please list them below.

Appendix F: Qualtrics Survey Link Email/Letter

Hello,

My name is Nathan Daniels, and I am a Business and Marketing teacher and a graduate student at the University of Wisconsin-Stout. Currently, I am working on my thesis and looking for your contribution through a survey on Information Communications Technology employed within your business and/or teaching and training setting.

The purpose of my study is to identify information communications technology hardware and software required of students (your future and current students and/or employees) in post-secondary education or the workforce. The results from this research will inform business educators in their curriculum, relative to hardware and software decision making. Through your responses, you have the opportunity to advance high school students in meeting your business/industry and education and training needs.

Phase one is an 8 to a 15-minute online survey designed to capture the context; specific to software and hardware that high school students should encounter in a career pathway program leading into business and industry. Additionally, you will encounter some basic demographic questions. At the conclusion of this survey, you have the opportunity to select into a telephone interview (20 to 30 minutes) which will be scheduled at your convenience. Taking part in it will further allow you to inform the study on information communications technology teaching and learning while students are in high school.

Please complete the survey by December 10th, 2018 at 9pm CST.

Thank you in advance for completing this short survey,

Nathan Daniels

Appendix G: Qualtrics Survey Reminder Email

Hello,

I just wanted to send a quick reminder to those that have not started or have not completed taking the phase one survey. The survey is very crucial to the information collected for this research project. Completing phase one does not require you to participate in phase two if you do not wish to.

Please complete the survey by December 10th, 2018 at 9pm CST.

Thank you,

Nathan Daniels

Appendix H: Qualtrics Survey Thank You Email/Letter

Hello,

I just wanted to say thank you once again for completing the phase one survey. The information you have provided will contribute greatly to what I am working towards.

For those of you that signified that you would like to participate in the phase two interview, I will be contacting those of you that signified your interest in phase two of the survey on Monday, December 17th to hopefully set a time later in the week to have our twenty to thirty-minute interview. I will work around your schedule.

Finally, I am still looking for more people to participate in phase two. If you said no but would like to anyways, please email me. My email is danielsna@my.uwstout.edu.

Thank you,

Nathan Daniels

Appendix I: Pre-Interview Email/Letter

Good Morning _____,

I want to once again say thank you for taking the time to talk with me later today. The time you are taking out of your busy day is greatly appreciated. I will be calling you at today from

Attached to this email you will find two items. One is a PDF of the UW-Stout "Consent Form." Please look it over before we talk today. I will ask you to verbally agree to the consent form. The other file is the "About, Through, and For Business Tool." This will provide you a little bit more information on the three points my research centers itself around. About Business was covered in the survey you previously took. With the remaining two being covered in our interview.

Thank you and I look forward to talking with you soon,

--Nathan Daniels

Appendix J: Interview Questions

Phase 2 – Interview Questionnaire

Interview Questions – Tied to RQ2 or RQ3:

The Interviewer will ask a “Grand Tour of Questions” of the Interviewee. The questions are meant to allow the interviewee to instill insight on the topic. The interview will start by asking the participant to reconfirm their willingness to participate in the research project and asking permission to record the conversation. With the persons, approval to record the first two questions will be repeated to have them on recorded audio giving consent. The Interviewer will ask permission to take notes during the interview and explain that the recordings will be used to create a transcript of the conversation. Finally, the “About/Through/For Tools” will be described to the Interviewee before starting the interview. The interview questions will start by asking RQ2 and having the person answer it. A selection of follow up questions will be used to deepen the conversation and gather more data.

RQ2: How should a student develop their ICT knowledge and skills within the context of their academic and career development coursework?

- Follow-Up Questions:
 - What topics need to be covered?
 - What tools and skills must be taught in schools to prepare students for the workforce?
 - How does your company train employees that do not have the skills necessary for the job?
 - Are there methods of training that your organization uses that could be applied to a classroom using the same tools?
 - Can you tell me more about XYZ?

RQ3: How should students experience ICT in their preparation to competently work in Business Management and Administration?

- Follow-Up Questions:
 - Do you currently have Youth Apprenticeship/Work Study students at your company?
 - Tell me more about your youth and adult training program.
 - How might a student learn the basics of running a business?

Appendix K: Illustrated Theme Reduction Table Sample

Name	Original Transcript	Concise Transcript	Emerging Themes	Condensed Themes #1	Condensed Themes #2	Enduring Themes
RQ2: How should a student develop their ICT knowledge and skills within the context of their academic and career development coursework?						
Cameron:	Well, and I'll answer it two different ways. I'm a firm believer in application-based learning. What's the relevancy in what their learning and how does it tie back to their, your third [inaudible] the career path? And each student is gonna have a different application based on where they wanna go. And I'll get back into that but the second part of it is really that learning for adaptability, what we talked about earlier in the conversation prior to you recording.	application based learning relevancy in what their learning And each student is gonna have a different application based on where they wanna go	application based learning	application based learning	Intuitive, Adaptive, Application/Project Based Learning using real-life examples/case studies Flexibility between different types of software	Flexible adaptive application-based learning showcasing similarities and differences across software and hardware platforms
Devin:	So I think that's one thing that-- between technology and education-- is going really well. But also, having projects to practice doing things with. You practice words in elementary school so you get pretty proficient in that and PowerPoint and all the different Office apps.	projects to practice doing things with so you get pretty proficient in that	Having project based learning	project based learning		
Kelly:	One thing I've found, being in the business world, is people learn very differently. Some are very hands-on and resourceful; they take the initiative to dive in and try different things and familiarize themselves with tools and strategies that are successful for them. However, not everybody is like that. Others prefer more of a guided opportunity where you're providing them with very much step by step instructions on how to do each thing. It really kinda depends on--I would think for you the nature of the student and how they best learn. I think you kinda have to look at a two-pronged approach where you have the tools that will equip students with the ability to do it hands on but also provide them with those status tutorials that would allow them to walk through a step-by-step process of how to do each thing. And it kind of has to be a blended approach that--once they have the tools, that they can walk through it themselves, that they can kind of try it on their own using the technology that's available to them.	people learn very differently very hands-on and resourceful they take the initiative to dive in and try different things and familiarize themselves with tools and strategies that are successful for them guided opportunity where you're providing them with very much step by step instructions on how to do each thing a two-pronged approach where you have the tools that will equip students with the ability to do it hands on but also provide them with those status tutorials that would allow them to walk through a step-by-step process of how to do each thing	People learn differently. Provide different type of instructions. Hand on and instructor guided.	different type of instructions		
Skylar:	So there was a lot of coordination that needed to take place and it pushed back due dates and it was just a mess. So, we should have probably all been on the same page going in to it. It certainly wasn't the students fault. I don't think we ever set forth, oh you have to do a Word document for this assessment. But now, we do. So we lived and learned that one. And I think that when a student has proficiency in Google Docs, I mean doing it in Microsoft Word is just gonna be another piece of software. They're gonna be able to do it no problem. Same thing with the Google Sheets in Excel. They're very similar. So students normally don't have much of a problem converting.	a lot of coordination that needed to take place and it pushed back due dates you have to do a Word document for this assessment Docs and Word, Sheets and Excel pair together don't have much of a problem converting	Google and Office are similar enough that a student can move in between when needed	Google and Office are similar enough that a student can move in between when needed		