

Learning a New Technology at Work: Age and Gender Effects

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Abstract

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Organizations often invest considerable time and money to implement new technology in the workplace. Whether or not a new technology is adopted by an employee is often a function of the ease of use of the new technology, and how that technology impacts the productivity, and well-being of that employee. But the workforce is diverse, and employees vary in age, and gender. We expected that not all individuals would embrace new technology with the same degree of comfort. In this qualitative analysis, we interviewed 22 participants and asked them to describe their level of comfort learning new technology. These participants varied in age and gender, as we would expect in the workplace. This thesis explored whether individuals of different age, and gender would vary in their comfort, or self-efficacy, using a new technology. Self-efficacy is the degree with which one expects he or she will be able to complete a task. We found that as people age, self-efficacy with respect to new technology was lower, and they were less comfortable using new technology. Older participants, particularly women over 50 were averse to adopting new technology. We found that, despite their tendency to avoid new technologies, the older participants preferred a hands-on learning approach when available. This thesis offers recommendations for future research in how to make the implementation of new technology in the workplace more accessible based on employee age, and gender.

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Introduction

Learning a New Technology at Work: Age and Gender Effects

The workplace is increasingly driven by new technologies. But technology does not exist in a vacuum. One thing that is critical to the success of new technology as it emerges is that it must be well implemented and widely adopted. If no one embraces a particular technology, it will fall by the wayside. With respect to business, if a company invests in new technology for the workplace, employees are expected to adopt it. Businesses spend large sums of money updating and rolling out new technologies each year, but if people don't embrace that new technology, then the money is wasted. When new technology is introduced, employees need to learn to use it, and actually use it for the business' investment in the new technology to make financial sense. How comfortable someone feels using a particular technology directly translates into how often that person will use a technology. The goal of this research is to explore employees' gender, and age as factors that might affect employees' experiences of learning and using new technology.

Technological changes at work

Since the beginning of the industrial revolution, new technologies have been adopted in the workplace on a rolling basis, and these technologies change the way work is done. Whether it be the computer, the fax machine, the internet, or webcams, the work environment is constantly changing, being automated, and adapted to change the landscape of the workplace, and the level of productivity while at work. When computers were first introduced into the workplace, employees could run programs and make calculations much faster and more efficiently. Automation greatly sped up repetitive tasks. Later, with the advent of the fax machine, a letter could be sent across the world in just a few minutes. Forty years ago, offices used the mail system and filing cabinets. Today, a salesperson can fire an email to a prospective buyer while on vacation in the Caribbean. Now, people can send hundreds of emails at a time with the click of a button, reaching a month's worth of sales leads in just a few minutes. Technology has never really stopped changing in the workplace. Virtual meetings and remote work are only the latest in a long line of technological changes that have taken place at work. In the 80s we had the fax machine. In the 90s, the internet. In the early 2000s, we had mobile texting, and social networks. In the 2010s we had green initiatives like going paperless, teleconferencing and remote work. Part of what drives the changes in the workplace is the digitization of the workplace to improve the employee experience (Dery., Sebastian, & van der Meulen, 2017). These improvements help to drive success by addressing pain points in the workplace. Improvements can include technologies of various sorts to foster innovation and encourage communication.

The 2020s began with a global pandemic. Covid19 had a profound influence on how work is done. Covid could be seen as a shockwave that brought with it the need for employers and employees to adopt new technologies. One major reason for those changes was social distancing. Because of government implemented social distancing protocols, many offices closed and people needed to do their work from outside the office. This change opened the door to remote working. Many offices opted to implement remote work policies to conform with social distancing guidelines. People could stay at home while being able to do their office work, allowing for people to self-isolate and stem the spread of covid-19 by keeping a distance that wouldn't be possible if everybody worked in the office. The point of

the measures was to reduce transmission of the virus. But having people work at home on such a large scale for the first time required those people to adapt to a new way of working. Between April 2020 and June 2021, 30% of workers worked most of their hours at home, as opposed to only 4% in 2016 (Quotidien). This meant that workers needed to adapt to a new working style. Telework brought with it a new way to get work done. Much of the new way to work is with a computer, a webcam, and an internet connection. Many businesses adopted programs like Zoom, and Microsoft Teams for meetings and conferences, and learning these programs became necessary to get through one's work tasks. This put a pressure on employees to learn how to use a new software, and work methodology.

This thesis is about comfort levels in learning technology. Its goal is to understand how people adapt to technological change in the workplace. Is everyone equally comfortable learning to use new technologies? Are there any differences between workers and their comfort using technology? As technology is an integral part of the workplace, we thought that answering this question was of significant impact. Employees in the workforce are divided by many demographic factors, including age and gender. Are there any differences between men and women's level of comfort with learning new technologies? Are there any age differences with comfort learning new technologies? Let's review some basic research that says that there are.

Gender Differences in Learning New Technology

It just may be that there are differences between how men and women approach new technologies and how comfortable they are with learning them. As such, men and women may not approach new technologies in the same way. Attitudes towards new technologies, level of confidence, level of comfort using new technologies and self-efficacy may vary by gender. Let's see how.

Hartzel (2003) conducted research that provides support for the notion that there are gender differences with comfort using a new technology. In her study, Hartzel explains how different software packages can dramatically change how business is done in a workplace. A place of business might have one software package one year, and want to switch to another software package the following year if the new software promises to confer some benefit for the company. Crucial to the success of the new software to the business is not only the rollout of the software itself, but also the adoption of that software by the employees of the company. To study possible gender differences in how men and women feel about new technologies, Hartzel conducted a research study involving eighty MBA students, male and female, where she presented the students with a software package for creating websites. None of the participants had ever used the software before. Participants were asked to describe their own self-efficacy regarding their anticipated success with a software package (Bandura, 1977), that is, their expectations about their ability to use the software to maintain a website in the future. Hartzel defined self-efficacy as "the measure of one's confidence in mastering a new [future] challenge (page 167)." A high score on self-efficacy meant that the participant believed that he or she would be successful maintaining the website after the study.

Participants completed an initial questionnaire about their self-efficacy beliefs before ever using the software — whether they would be able to use the software appropriately to maintain a website for a given time frame. After the questionnaire, the participants were given a hands-on tutorial on how to use the software, and in the tutorial they built a mock website. After the tutorial, the participants were given a second questionnaire about self-efficacy where they were again asked questions about how confident they were with the prospect of maintaining a website using the software. In addition, participants were asked about their perceptions of the ease of use of the software. In the results of the study, and

independent of gender, Hartzel found that those with higher experience using computer-based technologies were more comfortable with the software and showed a higher perceived self-efficacy. In both males and females, self-efficacy was related to being exposed to a new, but similar, task as one they had done in the past - more experience using a computer led to higher self-efficacy with this particular software.

An interesting gender-related finding was that Hartzel (2003) found that before the tutorial, men had a higher reported self-efficacy to maintain a website using the software than women did. The researcher also reported that men and women both expressed higher self-efficacy after the tutorial, but the increase in self-efficacy was greater for women than it was for men. This study suggests that hands-on tutorials may have a greater impact on the confidence of women than it does for men.

One explanation that Hartzel put forward was that men tended to have a higher reported self-efficacy before the tutorial than women did because women underreport self-efficacy before having executed a particular task. After the task, however, women become confident enough to use the software that they reported higher self-efficacy than the men did. Because comfort with learning new technology might be a precursor to how well someone adopts a new technology at work, findings like Hartzel's about self-efficacy could be used to anticipate how to better implement technology in the workplace. It allows organizations to imagine how to present a new technology at work in such a way that plays to the strengths of both men and women for easier adoption.

In another study, Koch, Müller, and Sieverding (2008) found in their research that women and girls were less likely to own computers, and had less up-to-date computers than men did. For some time, the researchers note, there was a stigma against women who used computers. This stigma is a form of negative stereotype where women and girls were discouraged from using a computer. This negative stereotype might ultimately hamper a woman's comfort with learning to use computers and other new technologies. Koch, Müller, and Sieverding (2008) also found that women and girls attributed a computer failure more to internal reasons, which may hurt their self-confidence, rather than to external reasons as the males did. In a task that was purposely designed to fail, participants were either told that males were better at the given computer task, that females were better at the given computer task, or neither. Women who were told that men were better at the given task, a form of negative stereotype threat, attributed the failure to personal reasons more than the other groups did.

These findings suggest that, in the presence of negative stereotype threat, women will attribute the failings of a technology to their own lack of understanding instead of to a problem with the technology itself. This stereotype mechanism could make it more of a chore to want to undertake learning a new technology for women because they would want to avoid potential failure - Technologies that include computer software, such as Zoom, and Teams, and other technologies such as social media, and other technological devices. Being discouraged from using new technologies might then translate into reduced usage of these technologies which feeds back into a diminished success with them. Such a lack of opportunity to perform might lead to a lack of self-confidence in women and reduced self-efficacy.

There may also be other reasons why women display less self-confidence with technology. Guillén, Mayo, and Karelaiia (2018) found that in many cases, self-confident women had less organizational influence than men who appeared to be less self-confident. In their study, of the men and women who both appeared self-confident after performing a task successfully, self-confidence in men translated directly into organizational influence for the men, but self-confidence in women did not translate into organizational influence in the same way. For the women to have more organizational influence they needed to be prosocial,

caring for the social aspect of the organization, in addition to being self-confident with the task. Specifically, the researchers found that “women were able to translate their self-confident image into influence only when they also displayed high prosocial orientation, or the motivation to benefit others” (Guillén, Mayo, & Karellaia, 2018, page 846). Women might need to present themselves and their use of the technology as high in prosocial orientation, which might discourage them from displaying self-confidence at work, another difference between men and women using technology.

Age Differences in Learning New Technology

In addition to the differences between men and women’s use of technology, Morris and Venkatesh’s (2000) study found differences between age and technology adoption. They found that intention to use a new technology and actual use of a technology differed by age. In their study, Morris and Venkatesh used the Theory of Planned Behavior model (TPB) that states that the intention to use, and the use of a technology rely on three subcomponents. These three components are the attitude one holds towards a technology, the subjective norm surrounding a technology, and the perceived behavioral control for using a technology. The attitude towards using a technology is the degree to which a participant holds a favorable or unfavorable appraisal of a technology. When the attitude is favorable towards a new technology, the intention to use a technology will be greater. The subjective norm surrounding a technology refers to the perceived social pressure of using a technology. When social norm, i.e. social pressure, is higher, intention to use a particular technology generally increases. Lastly, perceived behavioral control is the degree to which a technology is considered easy to use. Generally, as behavioral control increases, the intention to use a technology also increases.

Morris and Venkatesh (2000) sampled 130 participants whose employer was in the process of implementing a new technology at work—a new software package for organization-wide data and information retrieval. Participants were trained to use the new system for two days by being given interactive lectures and hands-on use of the software. The use of the software at work was voluntary because the participants could use either the old system or the new system. Over a period of five months, participants' reactions to the software and their usage of the software was measured. Since participants could use the old software, they were not obliged to use the new one. Once the study was concluded, Morris and Venkatesh found that older individuals had a more negative attitude towards the new technology in the study, and so, had a lower intention to use the technology. They also found that older individuals were especially sensitive to subjective norms, so as pressure to use the software from people who are significant to the participant increased, so did their intention to use the technology. Subjective norm is the degree to which a person wants to please important others, so the findings suggest that older individuals were more inclined to want to please close others by adopting the new technology. Finally, Morris and Venkatesh found that as perceived behavioral control increased - the software was easy to use - so did the older individuals’ intention to use the technology. Morris and Venkatesh found that age was negatively related to participant attitude towards using the new software, as well as their actual usage of the new software. These findings suggest that older participants were less comfortable using the new software, and more comfortable with using the existing software.

These findings were in line with findings from research by Sharit and Czaja (1994) that showed that older workers have more difficulty adapting to change in the environment and are more likely to stick to processes that they already know. The older participants preferred to use the older system than to use the newer one, showing that there are differences between how younger and older people approach technology. We were curious to see if we

could reproduce the findings of Morris and Venkatesh's (2000) study - that age was related to comfort with learning new technologies, the subject of this thesis.

Age and Gender Interactions

We also wanted to see if there was an interaction between age and gender when adopting a new technology. That is, do the differences seen as workers age differ between men and women? One study suggests that, when it comes to intention and usage of technology, yes, they do. Specifically, research by Morris, Venkatesh, and Ackerman (2005) found that “gender differences in technology perceptions became more pronounced among older workers (page 69).” The research builds on Morris and Venkatesh (2000) by examining if not only age, but also gender moderates the relationship between worker attitudes, subjective norms and perceived behavioral control and intention to use technology, according to the Theory of Planned Behavior model. Specifically, Morris, Venkatesh and Ackerman looked at the interaction between age and gender, and they had three hypotheses for these interactions, one each for attitude, social norm, and behavioral control. Their first hypothesis was that gender differences in the importance of attitude towards using a technology would be more pronounced with increasing age. The second hypothesis was that gender differences in the importance of subjective norm would be more pronounced with increasing age. The third hypothesis was that gender differences in the importance of behavioral control would be more pronounced with increasing age.

Morris, Venkatesh, and Ackerman had five organizations participate in their study. The organizations were implementing a new software technology for work. Four hundred and forty-five individuals participated in the study. Participants were given a day of training on a new software and their reactions and use of the new technology was recorded at three time-intervals, initial, after one month, and after three months. They found significant differences in attitude and intention to use the new technology by age by gender, in subjective norm and intention to use the new technology by age by gender, and in behavioral control and intention to use the new technology by age by gender (Morris, Venkatesh, & Ackerman, 2005). These findings report that attitude towards using a technology was more important to intention to use a technology for men than it was for women with increasing age, that subjective norm weighed heavier in women of increasing age when it came to intention to use the new technology, as well as use of the technology, and that behavioral control and perceived ease of use was most important to women of increasing age. These findings suggest that there are, in fact, differences in how men and women adopt new technologies at work as they age.

Why might older women be the least likely to be comfortable learning and adopting new technologies? One answer might be rooted in history. After the 1950s and 60s, the role of housewife took a backseat and women began entering the workforce in greater numbers. The technology that the women of that era were mostly concerned with were household appliances - fridge, stove, vacuum cleaner, etc. Women were not encouraged to use technology outside of that needed to maintain the household, which might explain why older women have had more difficulty adapting to technology at work. It has only been in recent years that girls and women are encouraged to use computers (Mackey & Petrucka, 2021). With conferences like the 1995 World Conference on Women, women were encouraged to use information and communication technologies. It was only in the early 2000s that the gap between males and females for computer use started to narrow in North American culture. Even now, females are less likely to own a computer than men are (Koch, Müller, & Sieverding, 2008). The women who are older than the time of computer parity are more likely to have a background where using computers and various technologies was not as encouraged for them. This may then translate into women not being as confident in

approaching new technologies as men are, and therefore their performance using that technology may be diminished. Since it is precisely older women who were less likely to use computers and new technologies in their younger years, we wondered whether older women would be less comfortable learning new technologies for work today.

Research plan

Because of the range of technologies currently being used in workplaces and the rapid technological changes in 2020-2021, we decided to use a qualitative approach. The qualitative approach allowed us to explore a rapidly changing environment without having a strict set of predefined questions. Current events like Covid, as well as the great changes we see in the way software is being used, including machine learning, and the fact that the use of many technologies in the workplace is not voluntary but obligatory leave us with a great number of possible questions - too many for a survey. Qualitative answers allow us to explore a vast territory that can be analyzed without having a specific question. Because the landscape of technology is vast, a qualitative approach is useful. In addition, qualitative answers provide us with more nuance and give us a feel for the individual that cannot be captured through quantitative approaches. To answer our questions about age, gender, and technology, we interviewed individuals to see what they had to say about using new technologies.

Method

Participants

We conducted interviews with a convenience sample of 22 workers in a variety of fields. Participant ages ranged from 23 to 79. Seven of the participants were female, and there were 14 male participants. We explored a variety of occupations, including trader, lawyer, and engineer, among other occupations to see how each felt about learning new technologies in general. It may be of importance to note that the occupations surveyed were generally occupations requiring a higher degree of education. The length of time the participants had been in their organizational role ranged from 10 months to 44 years (see Table 1). They described adapting to a variety of technical changes at work including videoconferencing using programs like Teams, and Zoom, going paperless, 3D printing, CNC cutting tools, social media, and online courses to name a few.

Measures

We conducted semi-structured interviews in May to July 2020, asking the participants questions about their current duties at work and their job tenure, a recent technological change that had taken place at work and how they reacted to it, and whether or not, in general, they were comfortable learning new technologies. We also asked their gender and age, and finally, their views on whether they believe that there are differences between how older and younger people use technology at work. The interviews were all done online and were audio recorded with the permission of the interviewees. The audio recordings were then transcribed for analysis.

Table 1

Age, Gender, Occupation and Job Tenure of the Interviewees

Name	Age	Gender	Occupation	Tenure
Kyla	23	female	Financial trader	2 years 4 months
Norris	27	male	Financial analyst	10 months
Michael	30	male	Financial manager	9 years
Alexander	32	male	Operations manager	5 years
Adele	40	female	Elementary schoolteacher	17 years
Ricky	40	male	Law firm partner	15 years
Ariel	48	female	Operations manager	6 years
Christopher	48	male	Financial trader	20 years
Shawna	48	female	Immigration law owner	25 years
Cody	49	male	Mechanical engineer	5 years
Melissa	49	female	High school teacher	22 years
Taylor	51	male	IT business analyst	3 years
Marilyn	56	female	Veterinarian	36 years
Mark	56	male	Marketing firm owner	2 years
Brian	57	male	Police officer	35 years
Jake	57	male	Home inspector	6 years
Bill	58	male	Accounting firm owner	11 years
Dylan	61	male	Operations manager	3.5 years
Kassie	63	female	School nurse	16 years
Ralph	65	male	Banker	3 years
Tommy	66	male	University professor	22 years
Donald	79	male	Shareholder relations	44 years

Results

We begin with a summary of the comments made by each participant. These are presented in order of ascending age. We rated the participants in their comfort learning new technologies from 1 to 3 based on some of the things that they said in their interview. A score of 1 indicates the individual was not comfortable learning new technology, 2 was moderately comfortable learning new technology, and 3 was very comfortable learning new technology. Two independent coders were used for inter-rater reliability. Their scoring can be found in table 2.

Kyla is 23, female, and works as a financial trader. A recent change for Kyla is that she used to receive her statements in paper, and now she receives them electronically. Kyla says that she is comfortable with learning new technologies. In her fields, there are new technologies that arise from time to time. Kyla says that the changes to technology in her field are more about how work gets done and less about how she does her work “these kinds of technological changes are more about how the business operates and less about my tasks.” Kyla also says that she keeps up with the new technologies at work “I am constantly adapting.” When talking about the factors that help Kyla adapt to new technologies she says “Understanding the nature of the business.” Once she can wrap her head around the changes that are to be made, Kyla has a better time adapting.

Kyla says that technological changes come with pros and cons. Sometimes, when the internet connection is not performing adequately at work she says that some traders miss out on trades because the market keeps moving regardless of if one is connected to the internet or not. Something that Kyla says constrains her learning is when information cannot be divulged readily, because the actors in her field sometimes need to keep secrets. Kyla also talks about how the clearing firm for the company she works for got bought out and they had to consolidate the two systems, which categorized things differently. In terms of differences between older and younger workers, Kyla remarks that, although she has been taught to do things a certain way, to include models and statistics, her boss isn’t interested in them. As an older worker, Kyla’s boss just wants to see the critical information and doesn’t have time for the rest. Whereas Kyla tells the story with its constituent parts, Kyla’s boss just wants the headlines.

Kyla says that she is comfortable learning new technologies and that she is very skilled at Excel. As a rating, we’ll say that Kyla is very comfortable learning new technologies, and we’ll rate her a 3.

Norris, 27, has been working in his current position for ten months. Norris is a financial analyst, analyzing financial data and making forecasts. A recent change that has affected his work is Covid-19 and the use of Teams. About the use of Teams, Norris says that he had to forcefully adapt - “Although, yes, there’s been some teething issues, it’s largely been ok. I feel like everyone’s got into a relatively steady rhythm of what to expect now.” At first, Norris says that he had some audio issues with Teams but quickly resolved that with the use of new headphones. Norris says that he is comfortable learning new technologies. When asked what factors aid in his learning, Norris said that he’s always been using computers “I’ve always used computers, ever since I was young. [...] I’ve always used computers, so I’ve never been too scared of new technology in that sense.” Norris says that a lack of training can constrain his learning. Norris says about older workers that he sometimes sees them struggle to learn new technology.

Because of some initial difficulties using the new technology, we rated Norris as moderately comfortable learning new technologies, a 2.

Michael, 30, male, financial manager is comfortable using new technology. He's been with his organization for nine years now. Michael says that a recent technological change at work was the use of Teams. Michael says that he began using Teams because of Covid saying "It's [teams] has allowed us to remain productive. Its allowed us to collaborate with our peers. I'm on Teams all day pretty much." Michael says that the switch to Teams has been positive for him and has kept him productive. Michael has not had any special training or resources to learn how to use Teams, he says that he learnt to be proficient in it by using it every day. Michael says that some factors that help him to learn new technology like Teams is his demographics, says "It's probably demographics, like the age I am. I think it's easier to learn technology if you grew up with it, to a certain extent. Compared to older generations." Michael is also excited to explore new technologies at work, and says that colleagues at work are also excited to explore new software at work, but noting that it is mostly the younger generation that would prefer to do so. Michael says one difference that he's noticed between the older and younger workers is that with the older workers, some struggle with technology and others don't. He also says that "you could also say that about our generation as well."

Because of his ease of use with technology, Michael gets a rating of very comfortable learning new technologies, 3.

For Alexander, 32, male, operations manager, learning a new technology is comfortable. Alexander has been with his company for five years now. Alexander says that a recent change in his workplace is everything going virtual. Alexander says he likes learning new technologies if they are intuitive. Alexander also says that initially, he will resist learning a new technology, but will eventually come around. With respect to whether or not he feels comfortable learning a new technology "Yes. I like it. I resist a little bit but at the end I'll come around." Alexander does not work from North America, but from Asia. When everything went online, Alexander learned how to use things quickly, but says that others in his part of the world don't like to use video chat technology because they are camera shy "People here are very camera shy. Women especially. They do not want to be seen on the camera. They don't like it." Alexander himself is comfortable with the camera, though, but only outside of Asia where people are more comfortable with video chat "Was it enjoyable? When I talk to anybody outside South Korea, yes. Here it doesn't work." Alexander also says that using video chat was a learning curve "At the beginning, I wasn't turning on the camera. We were just doing it like a phone call. But eventually, I wanted to be able to convey my feelings and emotions over the camera, so I turned it on."

Alexander appears very comfortable with the remote work technologies that have emerged for the workplace, but says that when a technology is not intuitive, he'd rather not use it. Alexander likes Zoom, for example. He says that he likes Zoom because it is intuitive. Talking about his first few times using Zoom "When I wanted to turn it on, it was intuitive. I turned it on, the video came, and I see how it works. I get it. Now I understand. That helps [me to adopt a new technology]." About older and younger workers, Alexander says that one difference is when Teams came out at work, the younger generation was quick to adopt it and put it on their phones and computers, while the older generation was not as quick to adopt it. Alexander says "For them, it's very difficult. There's the camera, the headset, the listening. [...] any person over fifty, they're struggling at my work."

Alexander likes new technology but he resists it if it is not intuitive, we'll rate Alexander as being moderately comfortable with learning new technologies, 2.

Adele, 40, female, enjoys using new technologies. She has been with her company for 17 years. Adele gets along well with new technology if she has the time. When she "doesn't

have the time” is something that gets in the way of her learning. A recent change that happened in her workplace is that everything went online during the pandemic. Adele is a music teacher, and when the pandemic hit, she had to start preparing online lessons. Adele is tech savvy, so she had "a few ideas" about how she would deliver her lessons to her students. Unfortunately, there were limitations with the platform she was using so that she could only upload 30 minutes of lessons at a time. About switching over to computer-based learning, Adele says “I enjoyed it. Because you can choose the time you worked although I had to set deadlines.”

Something that limits her success teaching online courses is the internet connections of her students. Students with a faster, more reliable internet connection are able to participate more fully with the lessons. She finds this limitation especially relevant to her field because she is teaching music. Because she could work from home, Adele was able to find more time for her husband and 18 month old baby. Adele likes this aspect of her remote work online. Adele says “I enjoyed it [about switching over to online work]. It was a nice change of pace. I could work from home, I have babies that were 18 months old and my husband was there.” She also enjoyed the control that the online environment brought to her classroom. Overall, Adele was comfortable with the change to remote work. She quickly noticed the pros and cons of working online, and she adapted without much difficulty. One thing that aids her in her learning a new technology is “talking to people who have used it [the technology] before.” Saying “My uncle taught me how to learn online, - looking for reviews, looking for troubleshooting” and using searches when she was unable to speak to someone directly about the technology. About the older generation, Adele says that “they come into the classroom and don’t know how to plug the computer into the smartboard. Some of the older ones are a little slower at picking it up.”

We can see that Adele is moderately comfortable with learning new technologies, saying that she enjoys learning them, but only if she has the time. We’ll rate her a 2.

Ricky, 40, male, law firm partner, has been with his company for 15 years and has no trouble learning new technologies. As a new change in his law firm, Ricky has recently adopted a new cloud-based system for working remotely. This software allows him to load a remote desktop from where he has access to all his files. All Ricky needs to connect to his files is an internet connection. Ricky says that he is comfortable learning new technologies but that sometimes he is resistant to change. When asked if he feels comfortable with learning new technologies he said “I do. This is a personality quirk that’s attributable to me. I do feel comfortable learning new technologies, but I have been told that I am sometimes resistant to change.” Ricky said that although he wasn’t pessimistic about the new cloud desktop technology, he was expecting some downsides, and it turned out that there were some. Ricky says that he will sometimes be resistant to change because of the unknowns of adopting a new technology, but, in general, Ricky says that he is open-minded about new technologies and often enthusiastic. Ricky has said though, “I think that learning something new is a mental impediment but there’s nothing wrong with it. Sometimes you have to learn something new to move forward more efficiently to better your business.” When Ricky sees the benefits of a technology, he can get excited about it, but if the pros are outweighed by the cons, he can get pessimistic. When looking at the pros, Ricky realized that the cloud-based remote desktop that Ricky has implemented at his work gives him and the rest of the staff the advantage of connecting to all the documents that they need for work, but Ricky says that one significant downside is that if there is no internet connection, or the internet connection goes down, that he is shut out of work. This is because all the files are on the internet, and without the internet he cannot access them. Ricky also notes that it is easier for him to be enthusiastic about technology that offers a solution. For example, Ricky lives in South Florida where

there are hurricanes. Ricky says that he is excited that the new cloud-based system will let him access all his files from outside the office if ever the office needs to close for bad weather. One thing that helps Ricky to learn is tutorials. Ricky says that having access to short video or text tutorials usually helps him to wrap his head around a new technology. Also, having support, particularly IT support, helps him learn a new technology as well. Ricky says that he hasn't noticed any differences at his office between older and younger workers. Ricky seems to be very comfortable learning new technology. We'll rate him a 3.

Ariel, female, 48, is an operations manager that works for a trading platform. Ariel has been working for her company for 6 years. As a recent change at her work, Ariel describes how a few years ago a fellow employee of the company decided to make an online social networking presence for the company, including a Facebook page, and a LinkedIn page. Although Ariel describes being very comfortable with technology, the social networking pages that were set up at her work were left abandoned. Ariel says that this is because the employee who launched the pages left the company and no one was interested to carry on with maintaining those pages. Ariel says that she works best when technology is user-friendly. When a program is not user-friendly, she tends to pass it off to a colleague saying that if she doesn't know a program she can get annoyed "Because I don't have enough training and I don't have anyone to ask, I can get very flustered and annoyed." Ariel is comfortable with new technology if it is user-friendly and she has the right people to ask about it: "I need to learn as I go and be able to ask someone questions." Ariel finishes by saying that most of the technology that she uses at work has stayed the same, with the exception of social media. As we saw with the Facebook and LinkedIn pages of the company, social media is not something that interests Ariel a whole lot. Ariel describes how nearly twenty years ago she had noticed that the older generation was not able to grasp some of the changes that were coming to the workplace. Ariel said that some technologies had been around for decades, like the fax machine and the mainframe computer, and that although the older generation was comfortable with those technologies, they were not able to grasp some of the new technologies that were coming out, like email.

Ariel says that she feels very comfortable learning new technologies. Because Ariel says that she feels very comfortable learning new technologies, we'll rate her a 3.

Christopher, 48, male, financial trader, has been working for his company for 20 years. Christopher says that he's a creature of habit and would prefer not to make changes to his usual technology if he can help it. Christopher says that because time is money, he'd rather not spend any of his time learning a new technology if he doesn't have to. Christopher says that when it comes to any changes to his usual way of doing things, he would prefer if it were done in the background. Christopher said "I'm a creature of habit so even if I can upgrade, I won't. I like the way my systems are set up. If there is a change, I like it to be done in the background so I don't know about it. If I have to learn something new, I shy away." The most recent change that Christopher recalls in his field is the way trading is done, which happened at the beginning of his career. Christopher says that stock used to be traded in a "pit" where traders used to gather and yell their orders to find the buyers and sellers. Right when Christopher was starting his career, the state of the art was no longer to make trades in the pit but to use a computer. Christopher says that he quickly adopted to using the computer to make his trades back at the beginning of his career, but since that time was very reluctant to adopt any new changes in technology. Christopher said "If I have to go through a new learning [sic], I have to take time away from whatever I'm doing and it's going to cost me money. Anybody who has something to change [...] they have to do it in the background. I'm not changing. If I have to take x amount of time away from trading, that equals x amount of

dollars.” As such, Christopher is not comfortable with learning new technologies. He is comfortable with the setup that he has and is not willing to take the time out of his schedule to learn something new because that would cost him money. Christopher can adapt to change, but he is most comfortable when changes are made out of his view, and they don’t directly change the way that he conducts his business. About the older and younger workers, Christopher says that there is not much difference, and says “if they’re old or young, in our line of work, nobody wants change.”

Because Christopher doesn’t like to put time learning new technologies, we’ll say that he is not comfortable learning new technologies, and we’ll rate him a 1.

Shawna 48, female, immigration law firm owner, loves technology. She has been working for her organization for 25 years. Shawna says that it is because of technology that she is able to have a good work-life balance. Shawna says that technology has allowed her to work from home, using her phone and laptop, while doing chores and taking care of her son. Shawna says that the law industry has changed greatly in the past decades as being stuck in an office with an office phone and a fax machine has transitioned over to a cell phone and email. Shawna says that these changes have given her the freedom to work from home and attend to her work-life balance. Shawna says that she works mainly from home and that she embraces all technology that allows her to get her work done from home “technology equals freedom. I’m not chained to a desk. I can take my laptop, sit out here or in the park and nobody knows” talking about how she can work remotely and it won’t affect her client. Recently, Shawna has started using Zoom. Shawna says that a great thing about Zoom is that she doesn’t have to commute or “doll herself up” to go out anymore. “Let’s say it takes me twenty minutes to go and twenty minutes to come back, that’s forty minutes I’ve just saved in my day. I can either work during those forty minutes or rest and become more productive. The commute is a big one. Getting all dolled up is another one. [...] it’s a lot of wasted time.” Shawna says that Zoom has allowed her to take on consultations with first-time clients without having to go into the office and “wasting time.” Shawna says that because of the technology that she uses for work, she can be home when her son comes home from school. Because of this, Shawna doesn’t need to send her son to daycare and can spend more time with him “I can get stuff done and my kid isn’t missing out on anything. He’s at the park playing with his friends, outside, doing exercise and having fun. I can still get my work done. That’s balance between work and family.” While Shawna is working from home, she can keep an eye on her son as he plays or keeps himself busy. Shawna says that this allows her to bond with her son better and is a part of her balance of work and life. Everybody needs to allocate time into each of three roles in life: personal time, family time, and work time (Ayca et al., 2007). Shawna says that it is because of technology that she can share some of her work time with family, and personal time to get a proper balance among the three. Shawna says that without the technology she uses she would not be able to balance work and life as well. Shawna says that without the technological changes of the past decade she would still be at the office, and if that were true then she would need to send her son to daycare and spend less time with him. Shawna says that if she worked at the office that her laundry, cooking, and other chores that she can get done during work time would still need to get done after coming home from the office. Because of all these benefits, Shawna is very happy with technology and has learned to embrace technology and stay up to date with all the technologies that can keep her work time, personal time, and family time well balanced. With work from home technology, Shawna says “while I work from home, I can do my laundry. I can fill and empty the dishwasher. I have been on the phone with the clients for interviews where I don’t need to write while folding laundry. That is balancing family or home and work.” Saying that without using technology to its maximum potential, and having to work in

an office, she can't get that work-life balance that she so enjoys today. About the older and younger generations, Shawna says that the younger generation is more "techy" and could teach the older generation lawyers a few things because they were born with technology. Shawna also says that the older generation has their skills too, using their memory more, for example, being able to know where in the civil code a particular article of law is, including the section numbers. Shawna says that both old and young have their strengths and weaknesses.

Because Shawna embraces new technologies, we'll say that she is very comfortable learning new technologies and rate her a 3.

Cody, 49, male, mechanical engineer, has been with his company for 5 years and is very comfortable learning new technologies. He claims that learning and using new technology is part of his job as an engineer. Cody describes a recent change at work as switching over to 3D printing, which has made his work more precise and convenient. Cody works with satellites and satellite components as part of his work. He has a high degree of knowledge about technology and various systems. Cody is always willing to learn a new system or technology because that is part of what he does. Cody says that he learns by self-study, conferences and peer-to-peer training. Cody says that older colleagues have more trouble adapting to telecommunications technology like Zoom or Slack. Cody also says that he is still young enough to adapt to new telecommunications technology, but that he has "no idea what TicToc is." About the older generation of workers, Cody says that "they are having trouble adapting to the new telecommunication technology" saying that "email is their go-to thing" and that they are having a harder time talking using telecommunications than writing emails, not being savvy with programs like Zoom or Slack.

Because Cody is an engineer and he is constantly learning new technologies, we'll say that he is very comfortable learning new technologies and rate him a 3.

Melissa 49, female, has been a music teacher for 22 years. As a music teacher, Melissa had to photocopy many sheets for her students. Melissa would spend hours every week making photocopies. Melissa says now that because of Zoom and other remote tools like Teams, she doesn't need to photocopy as much. Melissa says that a recent change is streaming and video-conferencing and that she is very happy to use it as it has made her staff meetings much more enjoyable. Melissa says that the meetings are more enjoyable because she can now do other things during staff meetings. Melissa says that she would keep her microphone and camera off and cook, do laundry, or even dust the house during the meeting "I love staff meetings now. I show up and turn the camera and microphone off. I do a lot of cooking during staff meetings. A lot of laundry gets done during staff meetings. I dust. Staff meetings used to be a hellish event." Melissa is also a part of several groups outside of work, including Toastmasters. Melissa says that the beauty with the new online setup is that she can present herself to her Toastmasters group minutes before the meeting starts, without the hassle of preparation or transit. Melissa also says that she learned PowerPoint and Word "Now I can powerpoint my way out of a bag." She gives many of her lessons using PowerPoint over Zoom. When asked if she feels comfortable learning new technologies Melissa said "Before the pandemic I'd say no because I've had to become proficient with it [technology]. I'd used computers as a glorified typewriter." One thing that Melissa says is unfortunate about doing everything online is the loss of spontaneity. Melissa says that she can no longer present her lesson using website bookmarks outside of a PowerPoint presentation on Zoom. Melissa says that she has not really noticed a difference between older and younger generation workers. However, she had noticed that at her work there is an older teacher who doesn't know how to turn on the camera for Zoom meetings.

Because Melissa says that she has become proficient in using technology, we'll say that she is moderately comfortable learning new technologies, we'll rate her a 2.

Taylor, 51, male, business analyst is comfortable learning new technologies. He's been with his current company for 3 years now. Taylor says that if he is stuck on something that he'll use Google or YouTube to see how to get something done. Taylor says that one thing that constrains his learning is that he doesn't have an IT background, so sometimes he needs to look for help. Taylor says that one recent change in the office is the switch to virtual mode - the use of online meetings and presentations. Taylor says that in the office he'll use software like Teams, Zoom, and Slack to have meetings and to chat, sometimes with clients. He also says that he's able to switch from one software to another depending on what the client needs, saying that it has kept him versatile "We are using a different platform depending on the client as well. In house we have our own platform, which is 'Slack'. Depending on the clients sometimes we have 'Zoom'. Some of them have the Microsoft [sic] Teams as well." Before Covid, Taylor said that most of his meetings would be in the office or at the client's office. He would often make contact using the phone or by email. Now, many of his meetings are online "I think because of the confinement the meeting room has been completely different because you have to switch to virtual mode." Taylor has been seeing more people virtually. About which method Taylor prefers, he doesn't mention either directly but says that the new way is very effective. About the time it took Taylor to learn the new software, Taylor says that it only took a few days. About older and younger generations of workers, Taylor says that the older generation embrace technology quicker than the younger ones, but that the younger ones may learn quicker.

Because Taylor is a fast learner, we'll say that he is very comfortable learning new technologies, and rate him a 3.

Marilyn 56, female, veterinarian, has been working for her company for 36 years, and works with animals. She performs tasks like lab work, surgery, x-rays, and giving medication. Marilyn doesn't really like computers, saying that she's not much of a technology person "I'm not a good technology person even though I'm a tech. The whole computer aspect, going through school obviously there were no computers then." Although Marilyn does her work very well, she has stayed in a relatively similar job position for the past 6 years. As such, Marilyn has remained in a veterinary technician role longer than many of her colleagues. This is because Marilyn says that she would rather avoid working on a computer all day, like many of the higher positions would require her to do. Because of this, Marilyn continues to work as a technician. Marilyn says that she gets held back by the use of terminology in computers "A lot of computer terms like router, USB port, a lot of the newer words. I have no idea what they are talking about." Marilyn is not too comfortable with technology other than what she needs to get her job done. Anything above that does not interest her very much. About the younger generation workers, Marilyn says that technology is built into them, but that everyone works together to get the job done.

Because Marilyn has difficulty grasping technology, we'll say that she is not comfortable learning new technologies, and rate her a 1.

For Mark, 56, male, marketing firm owner, learning new technologies is fairly comfortable "On a scale from one to ten, I'll say eight." Mark has been with his company for 2 years. Mark says that one thing that helps him to learn is being hands-on, and actually following the procedure - the keystrokes or links. Mark is the owner of a franchise graphics company. He says that a recent technological change to affect his company is the switch to a paperless, and automated process. Mark says that in roughly 2017, the company that he owns

wanted to focus on efficiency, so they transitioned over to going paperless for processing, estimating, production, and ordering. Mark says that this paperless process gives everyone along the way the information that he or she needs to accomplish what needs to be done at that step. Mark says that when he needs to learn a new technology, 9 times out of 10 he'll do it on his own. He likes this method because it allows him to learn hands-on. About the change over to paperless, Mark says that he is extremely comfortable with the new system. He says that it took some training, but now he's very capable with the new paperless process. Mark says that younger workers are "much more adept at picking up new technology" because they grew up with it, whereas the older generations started to use it in their 30s so it's less of a second nature for them.

Mark rates himself as fairly comfortable and an 8 on 10 for comfort using new technologies, so we'll rate him as moderately comfortable learning new technologies, 2.

Brian, 57, male, border patrol officer, is retired. Brian has been working for 35 years, and says that he can go either way when it comes to comfort learning new technology. He says that if the technology is complex, then he might have a harder time adapting and feel less comfortable. On the other hand, if the technology is less complex, he finds adapting easier "I didn't grow up with computers and video games and stuff like that. I'm not an easy fit for new technology." A recent change in Brian's workplace is the use of a new computer program for police investigations. Because the program is relatively similar to older software that was being used by the police force that he worked for, he has an easier time adapting to it, but says that he's had both positive and negative experiences with it "It's difficult and frustrating when you're trying to get things done." Brian says that it helps him to learn when the learning is hands-on instead of just using a manual or watching a video. Brian says that it is repetition and doing a task over again that helps him to learn how to do something well. Aside from learning things hands-on, Brian also says that audio-visual enhancements that are used in his police online learning system help him to learn a new technology. When the officers needed to be retrained on the new system, Brian said the "younger people get a grasp a lot faster than the older people."

Because Brian rates himself in between in terms of comfort using new technology, we'll say that he is moderately comfortable learning new technologies, 2.

Jake, 57, male, home inspector, has been with his company for 6 years, and is comfortable with new technologies. He says that there is a learning curve to new technology that needs to be followed, but that he is not afraid of new technologies "I expect a bit of a learning curve. I'm 57 so some things make sense right away. Technology doesn't scare me." Jake is a home inspector. His most recent technological change is the switch from using a binder to check off points about the home to the use of a digital software. Jake says that the software makes his job easier by allowing him to add pictures to the report. The software also allows him to start his report on the job and then finish it later. Jake is generally comfortable learning new technology. One thing that helps Jake learn is a hands-on approach. Jake uses webinars to help him understand how to use the software for his work more efficiently. The webinars help him to be more efficient, to be quicker with writing the reports and help him to write better reports. On the other hand, Jake says that "Social media and marketing are my weaker sides." Jake says about social media that he feels like he needs to hire somebody for that side of his work. The technology has helped Jake with his aging on the job "I can't do what I used to be able to do, especially on the physical side. The software helps out the physical side. I don't climb roofs anymore because I have a camera on a pole that downloads the pictures to my phone. You try to work smarter, not harder, as you get older. You eliminate as many hazards as you can." One difference between older and younger workers

Jake noticed was that he feels that “some of the older may not trust the technology or feel they don’t need it for their life.” For example, an older firefighter that Jake has worked with didn’t have a cell phone.

Jake says that he is not scared of technology, because of this, we’ll say that Jake is very comfortable learning new technologies, and rate him a 3.

For Bill, male, 58, accounting firm owner for 11 years, learning new technologies is pretty comfortable. He says that he’s comfortable learning new technologies, but won’t go out to learn the newest stuff because it might not stick around. Bill gets information about new technologies from a friend in IT. If his friend says that a technology is a good thing, Bill will be more willing to look into it. A recent technological change that Bill has seen at work is Zoom calling. Before the pandemic, Bill says that most of his communications were face to face, or by telephone. Bill says that now he’s starting to do work using Zoom. Bill says that one thing about Zoom is the lack of cues to know who is going to speak next. Bill says that he’s still learning how to know when it is time for him to speak, “There’s no way to push a button and say, I want to speak next, but you don’t want to cut a person off.” Bill is moderately comfortable with the new technology. He doesn’t have any problems with the computer program, per se, but with the way to communicate with others using it. About the younger generation, Bill says that they just use apps on the computer. For example, they won’t use a calculator, or keep file documents. Bill also says that the younger workers love social media and that he doesn’t use social media.

Because learning a technology like Zoom doesn’t come naturally to Bill, we’ll say that he is moderately comfortable learning new technologies, and rate him a 2.

Dylan is a 61 male operations manager for 3.5 years now. Dylan says that he is technologically advanced and computer literate. He also says that he is comfortable learning new technologies. One recent technological change that Dylan remembers is learning to use a CNC router (an automated cutting machine). Dylan says that he learned to use the CNC machine and really enjoys it “I learned the CNC in less than a week. That was when I first came. Now I’m an expert.” Part of what helps Dylan learn is the challenge of learning a new technology well. Dylan says that he learns best through hands-on approaches and trial and error. Dylan says he’s got a good mechanical background “I’ve got a good mechanical background. I’m a certified technologist. I’ve always been technologically advanced. I’m computer literate.” Dylan is also frustrated when he doesn’t have enough time to learn. About learning a new technology, Dylan says “If I can see it and visualize it, it’s done.” Saying that if he can figure something out in his head, Dylan can just do it after. About the younger and older workers, Dylan says that the younger workers are more likely to embrace technology.

Because new technologies come naturally to Dylan, we’ll say that he is very comfortable learning new technologies, and rate him a 3.

Kassie is a 63 year old female school nurse for 15 years. One recent change that Kassie has been through at work was the use of Zoom meetings to meet with the students’ parents. Before Covid, Kassie used to meet with the parents face to face or over the phone. Now she uses Zoom “As far as having to, the technology of using Amazon Connect to contact parents, having to rely on the computer for Zoom meetings. I had to learn all about Zoom meetings.” Kassie is moderately comfortable using new technology. She says “I’m not excited to learn new tech but I will learn it.” Kassie felt that learning Zoom was “confusing at times. Interesting. Challenging. I don’t know about enjoyable. Teaching an old dog new tricks.” Kassie is generally comfortable doing things a certain way and keeps on doing it that way unless she has to change. One thing that constrains Kassie in her learning is when she

feels inferior to the task saying that she feels constrained by “feelings of inadequacy, that others know more than I do. [By] People who seem more adept.” Although the switch to using Zoom for meetings was challenging for Kassie, she says that she is now “90-95% comfortable” using it for her work. Kassie does not make much of a comment about older and younger workers, other than that they have adopted a new form of social media at work called Schoology for posting grades and other school related memos.

Kassie has to push herself to learn new technologies. As such, we’ll say that Kassie is moderately comfortable learning new technologies, and rate her a 2.

Ralph, 63, male, banker hasn’t always been comfortable with technology. He’s been with his current company for 3 years now. In his early days, Ralph had bad handwriting and had to pay someone to transcribe his research paper into a more legible writing. Eventually, Ralph learned how to use computers, including how to type. Since that time, Ralph has seen many changes in the software and computing power used in the workplace. Ralph has adapted to many different systems up to and including the current Microsoft Teams. Ralph says that Teams is becoming ubiquitous and will “clobber everybody.” Ralph says that Teams is an incredible collaboration tool and excellent product, growing at an incredible rate. Ralph has tried many different systems and has learned that ergonomic “usability in software is extremely important.” Through all this, Ralph says that he has embraced change, but after seeing all the different iterations of software and computers that time is an important limitation to learning new technology - that learning a new technology takes time. Another thing that Ralph says is important to consider, for him, is over the shoulder training. Ralph says that working from home, there is no one to watch over the shoulder, so sometimes it can be tricky to deal with problems. Ralph says that tech support over the phone isn’t all that helpful, and that getting solutions from someone who is next to him is the best way for him to learn. Ralph says that he will embrace change if it makes things easier “if change is for the better I’m comfortable with it. If I have to make 10-20 clicks to enter data and it’s garbage - don’t give me that.” Ralph has come to the point where new technology needs to comply with regulation, security, and be secure and controllable for it to be of any use to him. As such, Ralph is very comfortable with learning new technologies. Ralph recounts when he was working with an older gentleman years ago, that the older gentleman didn’t know how to use a word processor. The gentleman was more familiar with a typewriter and thought that the word processor would work the same way.

Because Ralph has tried a variety of new technologies and succeeded at learning them, we’ll say that he is very comfortable learning new technologies, and rate him a 3.

Tommy, 66, male, university professor has taught and been in academia for over twenty-two years. He has taught courses online and in person. Tommy says that he is generally comfortable learning new technologies. One thing that Tommy says helps him to learn is his ability to control the pace of learning. By this he means his ability to slow down or speed up parts of the learning process - to speed up the parts that he readily understands and slow down on the parts that he needs to go over. Tommy also says that it helps when he can dig deeper into a particular technology - when he can get more information about something that he wants to know. One recent change for Tommy was the Coronavirus shutdown of the classrooms and the adoption of online courses. Something that constrains Tommy’s learning is his concentration span. He says that when things go off of his concentration, that he has a harder time to understand. Tommy also says another thing that gets in the way of his learning is when there are external things that need to be attended to, like a boiling kettle or hunger. Tommy appears to be comfortable with technology as he works in the university, prepares courses using various means, and gives online courses.

Between older and younger workers, Tommy says that some of the older workers can be very tech savvy and work well with the younger workers.

Because Tommy works with new technology at the university, we'll say that he is moderately comfortable learning new technologies, and rate him a 2.

For Donald, 79, male, shareholder relations for 44 years, comfort with new technologies is mixed. Donald is not particularly keen on learning new technologies but believes that sometimes he has no choice, so he does it when he has to and that he is not afraid of it. Donald says that one thing that helps him to learn is when there is online help. One recent technological change that Donald had to adapt to was doing things online. Donald began remote work with some of his employees using Zoom for things like meetings and budget details. Donald does have mixed feelings about using Zoom. He says that Zoom doesn't always work very well for him, that the audio is sometimes late getting to him so that he is out of turn when he tries to speak. Donald says that this problem is because of the audio reception of Zoom. About this, Donald says "Zoom works with mixed results; with my reception here my audio comes in too late. Someone else cuts into the conversation by the time my audio gets going." So although Donald accepts that learning a new technology is sometimes necessary, he isn't entirely comfortable with using Zoom for remote work due to the timing issues. Donald says that if improvements were made to Zoom, that his experience of using Zoom would be better. About older and younger workers, Donald says "I think the young people know how to manipulate and use and take advantage of technology. They do things faster and better."

Because of Donald's problems learning how to use Zoom effectively, we'll say that he is not comfortable learning new technologies, and rate him a 1.

Next, we looked at the agreement between the ratings by comparing with independent raters.

Reliability Estimates

Inter-rater reliability for self-efficacy was obtained by hiring two independent coders to rate the participants' self-efficacy scores (see table 2). Participant information was removed for the independent raters to avoid age biases. Where there were inconsistencies between the researcher's rating and the independent rater's rating, a second independent rater was used to verify consistency. There were 5 instances where the researcher did not agree with either of the two independent raters, however this inconsistency falls within a normal range.

Table 2

Reliability Estimates for Inter-rater Reliability

Name	Researcher Rating	Independent rater 1	Independent rater 2	Consistency
Adele	2	3	3	Coders said “very” instead of “moderately”
Alexander	2	2		Consistent
Ariel	3	1	2	Coder said “not” instead of “very”
Bill	2	1	2	Coder 1 said “not” instead of “moderately”
Brian	2	2		Consistent
Christopher	1	1		Consistent
Cody	3	3		Consistent
Donald	1	1		Consistent
Dylan	3	3		Consistent
Jake	3	3		Consistent
Kassie	2	3	2	Coder 1 said “very” instead of “moderately”
Kyla	3	3		Consistent
Marilyn	1	2	1	Coder 1 said “moderately” instead of “not”
Mark	2	3	3	Coders said “very” instead of “moderately”
Melissa	2	2		Consistent
Michael	3	3		Consistent
Norris	2	3	3	Coders said “very” instead of “moderately”
Ralph	3	2	3	Coder 1 said

				“moderately” instead of “very”
Ricky	3	3		Consistent
Shawna	3	3		Consistent
Taylor	3	3		Consistent
Tommy	2	3	3	Coders said “very” instead of “moderately”

For a cross case analysis, we grouped participants into four categories—younger males, younger females, older males, and older females. The younger/older cutoff was set at 50, which was essentially a median split.

Cross case analysis—gender and age

Younger Males

The younger males appeared to have an easy time using and learning new technologies. This is in line with the research. Of course not all the participants were highly confident using new technology. 3 out of the 6 younger male participants said that they were comfortable learning new technologies and that new technologies were natural to them. The high scoring younger males said things like “I think it’s easier to learn technology if you grew up with it”, “I do feel comfortable learning new technologies” and “I enjoy it [learning new technologies] it’s part of my job.” These males showed a more pronounced confidence and approach towards new technology. Two out of the 6 males appear to be moderately comfortable learning new technologies, citing things like slight difficulties adapting and getting the hang of things. They said things like “There have been some teething issues”, and “I resist a little bit, but then I come around.” Lastly, 1 of the 6 younger males did not appear comfortable learning new technologies, saying “I’m a creature of habit so even if I can upgrade I won’t.”

Younger Females

The younger females were also easy about learning new technology. Most of them scored strongly in their confidence to learn a new tech. Of the younger females, 3 out of the 5 appear to be very comfortable with learning new technologies. They said things like “I am constantly adapting”, “[I feel] very comfortable [learning new technology]”, and “Technology equals freedom.” 2 out of the 5 younger females appeared to have a moderate comfort with learning new technology. They cited things like “Before the pandemic I’d say no [to if she feels comfortable learning new technology]”, and that lack of time can get in the way of her learning. Of the younger females, no one scored a 1.

Older Males

The older males were split down the middle between very comfortable and moderately comfortable with learning new technology. Of the older males, 4 out of 9 appeared to be very comfortable with new technologies. The members of the group cited

things like only taking a few days to learn a new software, “Technology doesn’t scare me”, “I’ve always been technologically advanced. I’m computer literate”, and embracing change. These members showed a more pronounced confidence towards new technology. From the group of older males, another 4 out of the 9 seems to be more moderate in their approach towards new technology. Some of the members said things concerning learning new technology like “on a scale from one to 10, I’d say 8”, “I’m not an easy fit for new technology”, “[about Zoom] there’s no way to push a button and say ‘I want to speak next’”, and being limited by concentration span. This group showed a confidence towards learning new technology, but not to the degree of the other 4 in the group. Finally, 1 out of the 9 older males appeared to be a 1 and not so comfortable learning new technology. This member showed to have more difficulty with taking on new technology, and said that for him “Zoom works with mixed results.”

Older Females

None of the older females were very comfortable with new technology. Of the two, they both shared some resistance towards learning and using technology. This appears to be in line with the research that shows that older females were less confident about learning and using new technology. Of the older females 1 out of the 2 appeared to be moderately comfortable with new tech. She said things like “I’m not excited to learn new tech, but I will learn it.” and “[learning new technology] is like teaching an old dog new tricks.” This participant showed that she was willing to engage with new technology if she needed to, but was not forward in her approach to learning new tech. Finally, 1 out of the 2 older female participants was not at all comfortable with new technology. She actively avoided computers unless she had to use them, and said things such as “I’m not a good technology person.”

Participants’ views of age differences in learning.

We split the participants for this section along the under 50 over 50 line. Those participants under 50 very often said that they noticed the older coworkers struggling with technology. They noticed things like the older workers did not approach technology as much and had more instances of not knowing how to use a particular technology. The participants over 50 mentioned that the younger ones were more at ease with learning new technology. They described seeing younger coworkers as having a far easier time grasping and mastering new technologies at work. The younger generation was described as being quicker to adapt to and quicker to adopt new technologies. The older generation said things like the younger generation was more likely to embrace technology, but they also said that the younger generation was more reliant on computers and apps. Some said that the younger generation doesn’t do things manually anymore and that the older generation has an advantage when it comes to that way of doing things. The older generation said that the younger generation learns faster and the younger generation says that the older generation has more trouble picking up and learning new ways of doing things. These comments were fairly consistent. Of the 11 participants under 50, 6 said that the older coworkers at their workplace struggle with new technology, while 1 said that the older generation was stronger at manual tasks. There were 11 participants over 50, of whom 5 said that the younger generation workers learn faster, or embrace new technology quicker than the older workers.

Discussion

Many of the participants stated that they were comfortable learning new technologies, but there was a trend. Older individuals seemed to be less comfortable than younger ones learning new technologies, and older women were less comfortable than older men. This may be explained by some of the research we saw earlier in this thesis. For example, according to Morris & Venkatesh (2000) older individuals are more comfortable using ways that they already know unless a new way is user friendly, there is a social pressure to use it, and it offers some advantage over the current way of doing things. When things go well, why change it? It seems the adage "if it ain't broke, don't fix it" applies to older individuals more so than younger ones who are more willing to try and adopt new ways through experimentation. It could be that older individuals don't want to try new ways due to cognitive limitations during the learning curve, so they avoid unknown technology. With covid pushing remote work, individuals were somewhat forced into learning the videoconferencing technologies for work. Some avoided using computers entirely, like Marilyn, while others adopted the technology after an initial resistance. The older women in the study, notably Marilyn and Kassie talked about how they didn't have computers in school, and that learning new technologies was like "teaching an old dog new tricks." Their reluctance to learn new technologies might be due to the lack of computer technology in their younger years, but also the lack of encouragement to use computers before recent years.

Based on the literature review, we expected women to be less comfortable learning new technologies than men. This was not true. Both men and women counted among them those who were confident with new technologies and those who preferred to avoid new technologies. Some of the men, like Christopher, preferred avoiding new technologies. Christopher was comfortable with the technology that he had and didn't want to invest time or money on new technology. On the other hand, Marilyn had a dislike for computers and would prefer to do things by hand or "the old-fashioned way." There were also strong adopters of technology like Shawna and Dylan. They liked learning new things and saw technology in terms of its avenues to express oneself.

We also expected that as age increases, people would be less comfortable learning new technologies. This was not entirely the case. The males were comfortable in most cases even as age increased. Some interviewees, like Jake, mentioned how technology helped him adapt to aging at work. What we did notice was an interaction between age and gender and comfort learning new technology. We saw that as age increases, women were less comfortable learning new technologies than men. We see this with both Marilyn and Kassie, the older women in the study. The older males, for the most part, were comfortable with learning new technologies. Dylan, Ralph, and Taylor all appeared to be comfortable with new technologies. Dylan, having learned how to use a CNC, was one of the older participants who actively engaged in learning a new technology that was not related to remote work. Dylan says that he learned to master the skills needed to use the CNC very quickly and gets a lot of pleasure from using the CNC.

The oldest participant, Donald, however, seemed to struggle with learning the new technology. In his case, he was able to use the technology for remote working, Zoom, but he had difficulty using it in a way that was natural to him. The two oldest women participants, Marilyn, and Kassie did not particularly enjoy learning new technologies. This leads us to believe that the comfort with learning new technologies decreases faster with older women. Looking back at some of the studies from the introduction, we can surmise that this would be the case. What we wonder is if the women were given a chance to perform at a given technology task and if their confidence went up subsequently, if they would report a higher comfort with learning technology. We saw with Kassie that she was able to use

videoconferencing platforms adequately after using them, but she still reported not enjoying having to learn the new technology, as it was “like teaching an old dog new tricks.”

Recommendations

As a result of these findings, I would make the following recommendations. Because it is a large undertaking when an organization invests in new technology for its employees, organizations also want to take the precautions necessary to ensure that their investment will be well met, and will be adopted by the workforce. We saw that younger males and females, under 50, were more ready to explore on their own and adopt new technology at work. There was less insecurity about whether or not people in that age group would try new technologies and adopt them. Where it became tricky was the above 50 age group, particularly the women above 50. What became particularly obvious was the preference to learn things “hands on.” This means going through examples using the real technology as opposed to simply reading or talking about it. We saw back at the beginning of this thesis that women felt less confident about using new technologies until they actually used them. We also saw that women tended to internalize failings more than men. To counter this, a guided, hands on approach, might be best for getting older women to adopt a new technology at work. The older males also appreciated the hands-on approach. The recommendation is to let the younger employees explore a new technology on their own while answering questions that they may have about the new technology, while using a more guided and hands-on approach for those over 50. These recommendations while implementing a new technology in the workplace could increase the wellbeing and productivity of the employees, as well as reduce negative stereotypes.

Limitations

There were some limitations with the research design of this thesis, most notably with the sample size. We only had two women over 50 in our sample, making it difficult to generalize the findings to a larger population. There were also some differences in inter-rater reliability for the comfort with technology scores. The scores were not entirely unanimous and may lend themselves to subjectivity. Some positive aspects about the research was the richness of the qualitative design. The qualitative design gave us more data than a survey would have given us. The qualitative design also allows us to pick up on trends in the ways that the participants think and behave. We also had a good diversity of occupation in our study ranging from teachers, to engineers, to traders. Some future directions could include studying how to build an approach that will facilitate learning new technology. Many of the participants mentioned a hands-on approach as their preferred method of learning. Future research could study how to design a hands-on approach to learning that takes into consideration the needs of people over 50. This future study’s design should have a more balanced number of participants in each group, especially in women over 50. Studying how to train individuals in using new technology at work could help with productivity as well as the organization’s bottom line when technology shifts are implemented.

Conclusion

We interviewed people with ages ranging from 23 to 79 to see how comfortable they felt about learning new technologies at work. Not all the interviewees discussed remote work as a part of their interview, but of those that did, a majority were comfortable using technology, whether that technology was videoconferencing software at work or other forms of technology to get their work done. We know that technology has changed considerably over the years, and it continues to change every day. We've seen many changes in technology in the workplace in the past decades including computers, faxes, internet, email, green trends, and remote work. Keeping employees abreast of new technology makes the investments that organizations make in those technologies successful. We noticed through our interviews that older women were less comfortable with new technologies, as was our oldest male participant. In both men and women, employees can be comfortable with learning technology or they can report discomfort, avoidance, or reluctance. Implementing the best practices for employees when a new technology is being rolled-out in the workplace can increase the adoption of that technology in the best way possible for the employee, which would help protect the investment of the organization. This research points out that investing in new technology is a big undertaking, and organizations need to take into consideration the differences between men and women over and under 50 years old when making a switch. By making the training phase of a new technology more accessible, the organization can benefit from a return on its investment in a new process.

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Appendix

Semi-structured Interview Questions

- How long have you been working in your current organization?
- How long have you been in your current position?
- What are your primary responsibilities?
- Can you describe for me a recent technological change that has affected what you do?
- What were your experiences working with the switchover to computer-based learning?
- Do you feel comfortable learning new technologies in general?
- What factors aid your learning?
- What gets in the way of learning?
- How old are you?
- How old do you feel?
- Have you experienced any differences between how older workers and younger workers work with technology?